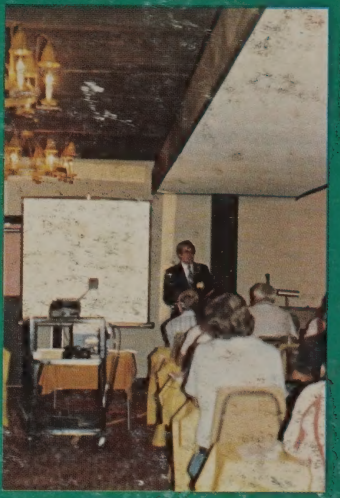

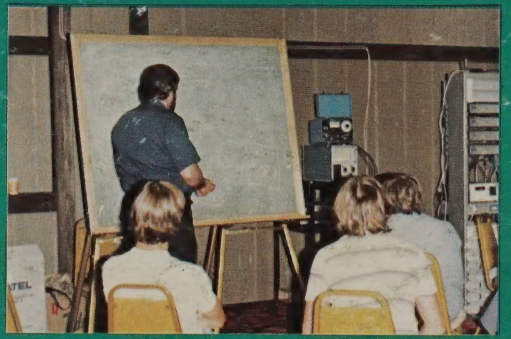

CATJ

AUGUST
1979

OFFICIAL JOURNAL
OF THE
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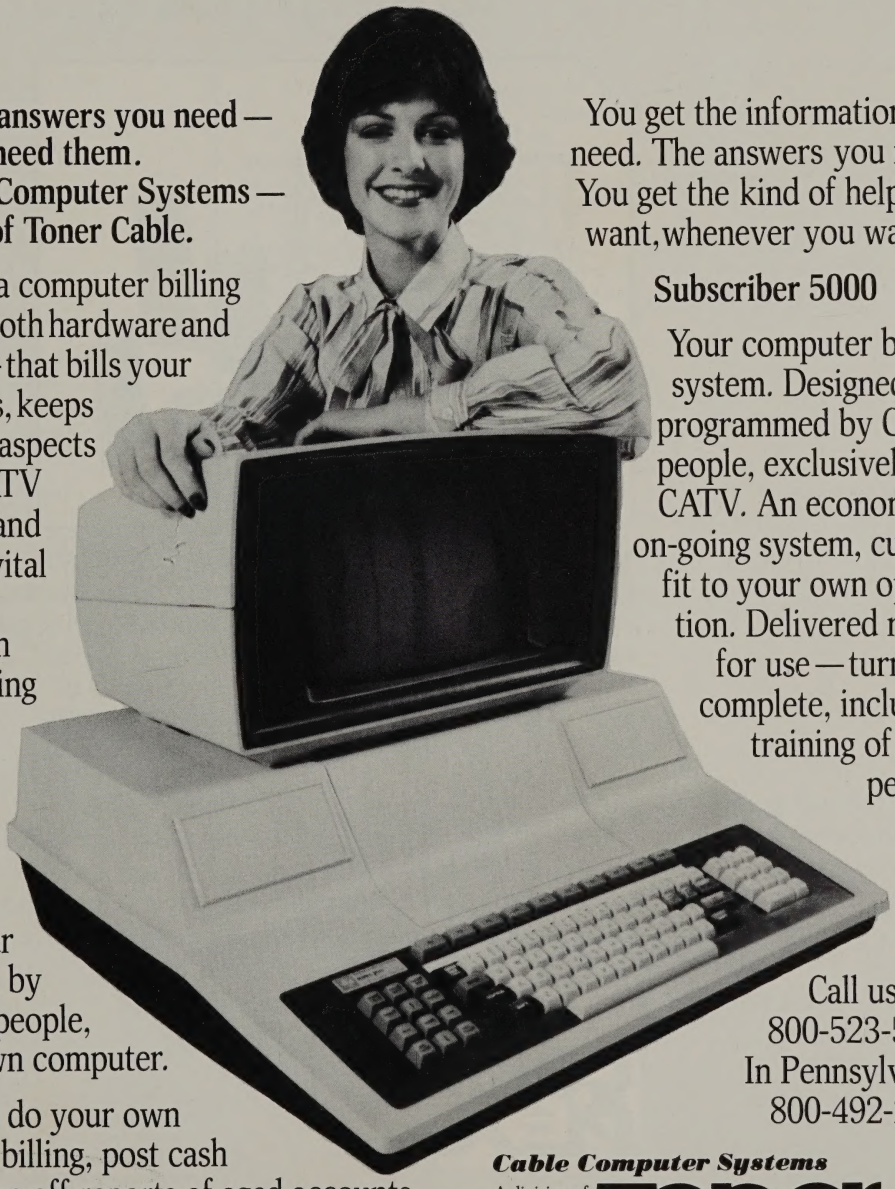

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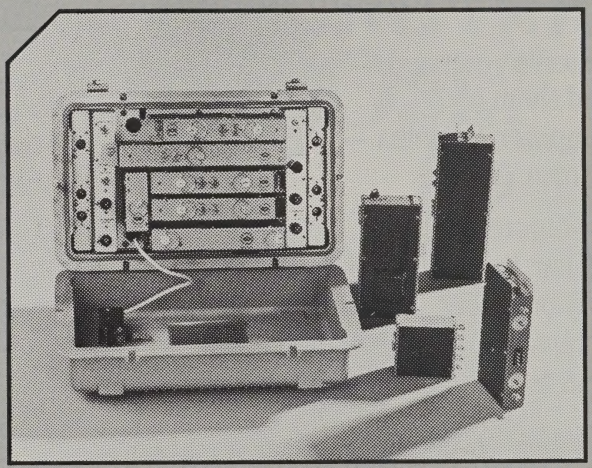

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AUGUST
1979

Volume 6 Number 8

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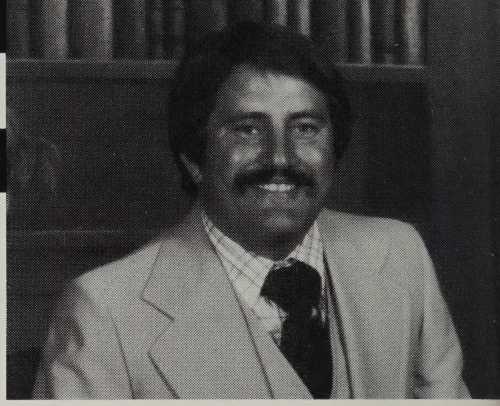
CATA-torial



BEN CAMPBELL, President of CATA, Inc.

A TELEPHONE COMPROMISE — SO NEAR, YET SO FAR

Plans are brewing in Washington that could result in a compromise of the major issue of telephone-cable ownership of cable television systems. The compromise, in broad terms, is a simple and good one for the cable television industry. It calls for Congress to adopt legislation that would specify that the telephone companies remain as the monopoly interest in the telephone business in their own areas, while the cable companies would do the same. That is, neither of us would try to cross-subsidize our services by trying to force our way into the other business in our own service area. This is especially important in the rural areas, because as everyone admits, the only way it would be economical for the telephone company to get into the cable business in those areas is to combine the services of telephone and cable television on "one wire" and that wire would be paid for in part with federal funds (REA). This would be a serious blow to the independent cable television operator who would be forced to try to compete in the "open marketplace" against a telephone industry backed with federal funds. Clearly this would not be an "open" marketplace, and there would be only one winner.

The agreement that is being talked about by the industries involved would call for fair and open competition in all new areas of telecommunications that could be provided by broadband technology, such as data services, fire alarms, etc. But the basic services, telephone message service on the one side, and cable television entertainment programming, including "pay cable" on the other, would be left to the two independent businesses. CATA has signed on to just such an agreement. But now there seems to be a hitch. As part of the agreement it was acknowledged that there are some areas of the country that simply will not get cable television services without combining services. These areas, in some quarters, are called "rural" areas, for the sake of shorthand. However now some of the rural telephone folks want to get more specific. Instead of going along with the agreement which calls for the FCC to decide on those real areas where cable will not be able to wire on its own (areas, say, of 10 homes or less per mile), they want the Congress to write into any law that the "rural" areas will get an automatic waiver of the cross-ownership ban based on an overall population figure, not leaving this subject to the discretion of the FCC on a case-by-case basis, as it is now. From the perspective of the Community Antenna Television Association this can not be a workable solution. The reason is simple. Whatever number is picked, or however the "rural" area is defined, it is based on the economics of today—on how much line extensions cost in today's technological world on the building costs of today, etc. We simply do not know what will happen tomorrow. It would be foolish to pick a number today and put it into legislation that would be very difficult to change tomorrow, or next week, or next year. The technology of rural communications is moving too rapidly to allow such short-sighted thinking.

CATA is more than agreeable to an approach that says that the FCC should determine if an area, today, will or will not receive cable television service absent the involvement of the local telephone company. If the answer is no, that local cable interests simply cannot economically build the area, then we have no trouble with the idea of the telephone company, or a cable company assisted with federal funds, going in and wiring the area. But these determinations must be made by an expert agency that can continually monitor the situation and one that is aware of new technological advances as they come along. For instance, in some truly "rural" areas it may not make any sense for either the

telephone company or the cable company to wire the area. It may be that scrambled translators, or MDS, or direct satellite to home technology would be a better solution. These are things the FCC can determine only on a case-by-case basis. To put a hard, a firm number in a bill would be to forever lock the concept of "rural" communications in the province of the telephone interests. A situation that would certainly be contrary to the public interest.

WE WIN A BIG ONE, AND A NEW FIGHT STARTS!!

The trade press has trumpeted the news before you read this, and the news is good!! "Program Consent" is dead. As a matter of fact, the entire effort of the House Communications Subcommittee to "rewrite" the Communications Act of 1934 has been shelved in favor of amending the existing act with particular emphasis on the common carrier section of the '34 Act. This is all to the good. CATA has maintained from the beginning of the particular fight that **"program consent",** or **"retransmission consent"** whichever one you want to call it, would literally kill the independent cable television operator. As you can see from the remainder of my comments this month, we are, of course, also interested in the sections of any bill dealing with the telephone company and its entry into the cable television business. But until "program consent" was dealt with, all other issues didn't mean much because we would have been forced out of the business anyway!

The smoke, however, has not even cleared the battlefield on the "program consent" issue and a new, and just as dangerous, battle appears to be looming in the haze. It is a familiar one to us—it's called **copyright.** As you all know, CATA was started because of the prospect of copyright payments. The ultimate legislation that was adopted reflected a great deal of effort on CATA's part to make sure the independent operator was not hobbled by copyright payments. That same fight is starting all over again now that the forces in favor of **"program consent"** have failed in that effort.

The new argument (actually, it is an old one trotted out for another try!) is that the cable industry is "stealing" the signals it is using because the copyright payments we make are so "low". There is no question but that Jack Valenti and the MPAA, as well as the NAB and others, will try again to get the House Subcommittee to insert **"program consent"** or a type of **"exclusivity"** into any bill they write. Those efforts will be fought, as they have been in the past, by CATA. A more dangerous threat, however, is a new proposal that would give the Copyright Royalty Tribunal the right to make major **"adjustments"** to the royalty formulas which were adopted in 1976 as part of the Copyright Law. The "adjustments", from what we have heard, could mean that cable would have to pay two, three, four, or five times as much as we do now. Of course the Royalty Tribunal is not saying that—they simply want more authority to investigate what the **"appropriate"** rates should be, but the folks who are looking for more money from us are confident that they will get a **BIG** increase if they can throw the issue open at the Royalty Tribunal.

Obviously, this is not the time for us to simply stand up and cheer about our **"win"** on **"program consent"**— it's time to get the wagons in a circle for the next fight!

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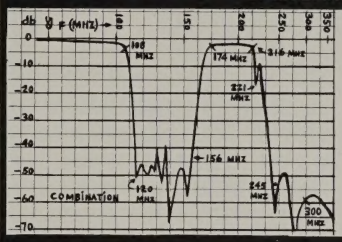

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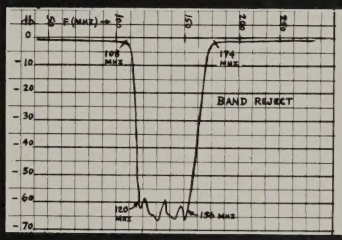

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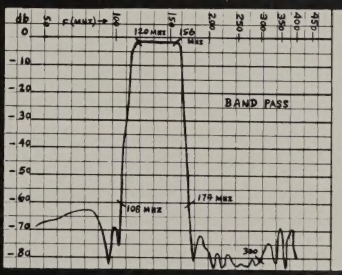

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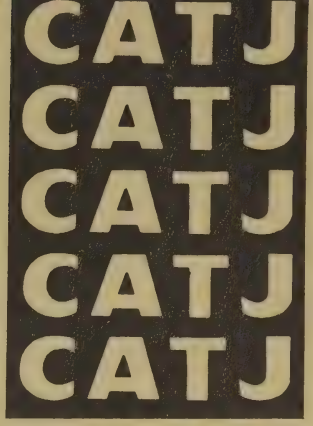

In the January 1979 issue of CATJ, we listed all of the material that had been published from the very first issue in May of 1974 through 1978. As we told you, back issues of CATJ are just not available, so the requests for copying these articles have been pouring in, taking a lot of time and an extra expense to you.

It occurred to us that this back material was still very timely and in demand, and that perhaps some of it could be reproduced in upcoming issues occasionally to accommodate some of the requests we have had.

SO, we would like to ask you, the readers, just what information you would like to see repeated, and also if there are other topics which you would like to have explored.

PLEASE fill out the survey section on the back of this to let us know what you would like to have, and we will pursue your requests.

FOLLOWING are the general subjects under which we listed the specific articles in the January 1979 issue. If you have that issue, refer to the article title; if you don't, indicate what general subject you would like repeated. Also add new ideas for research articles and exploration of technology.

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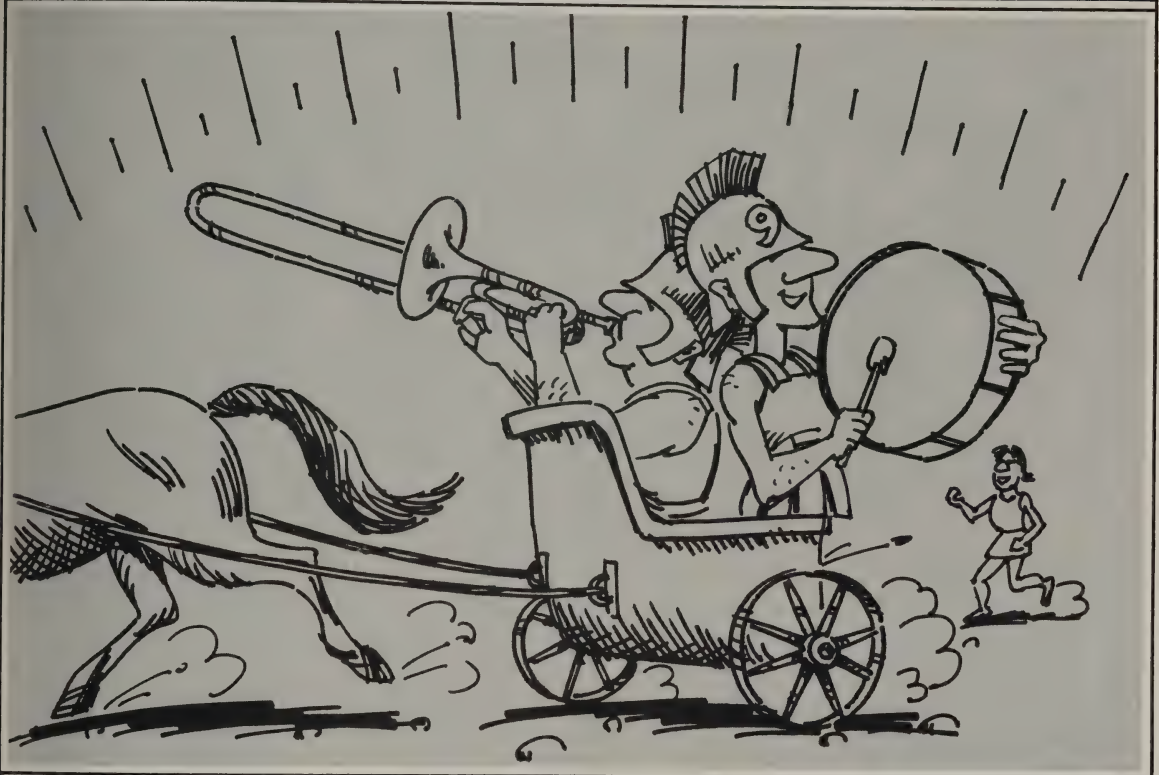

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If you could do it without appreciably increasing your costs . . . would you? Of course you would . . . but *can* you? Of course you can!

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Now, with VITEK's Multi-Channel Traps, you have the recognized advantage of having cable-traps on the pole plus the added advantage of being able to offer Multi-Pay service.

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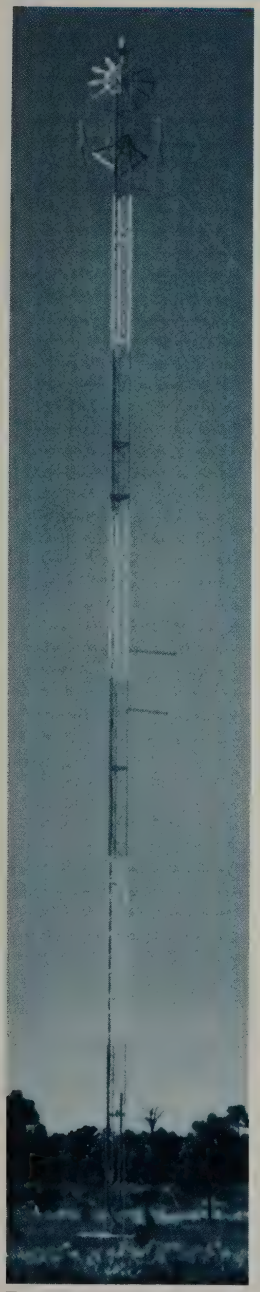

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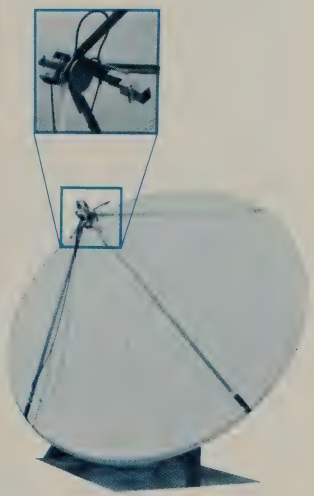

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CCOS-79 — THE BEST YET!!!!

ENTHUSIASTIC PARTICIPANTS ENJOY THE COOL BREEZES OF WISCONSIN

With beautiful Lake Geneva providing the setting for CCOS-79 and the delightful Wisconsin summer weather sending warm breezes over the grounds at The Abbey, participants and suppliers alike were delighted with the program, facilities, and functions at CCOS-79. What a beautiful scenario!! What terrific panels providing the sessions!! Tremendous sporting and entertainment facilities for the entire family!! Superior room for the exhibits, both inside and outside!! But, best of all, the key to the success of CCOS-79 was the participation in the sessions and the level of interest geared towards the various subjects.

The CATA Board decision to venture into another state from the three previous successes in Oklahoma proved to be a wise one—even though there was an increase in cost, no one could deny that the facilities offered ample space for exhibitors, lodging for singles as well as families, and every kind of recreational equipment that anyone would want, and certainly the location provided the pleasant weather that enhanced all the outdoor functions from the outside earth station session to the party and casino night held in that magnificant 60x150 red and white striped tent—indeed a departure from the 100-plus weather we experienced in Oklahoma those past three summers.

Boxes and wood tables in the Exhibit Hall and everything in disarray—this is what it looks like as it's about to happen. Already the group looks a little weary!

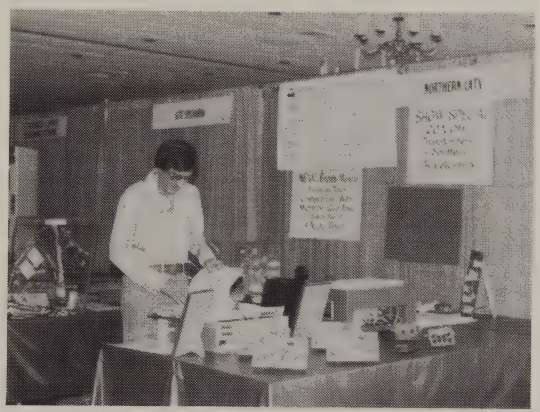
Although the gas situation slowed some **entire** families from attending, the cable operators flew in from every direction—into Chicago's O'Hare and Milwaukee's Mitchell Field and found a full-to-capacity house at The Abbey on that Sunday night, July 15th. Many were CCOS-repeaters—but we welcomed the new faces that appeared on the scene—some interestingly enough new to the cable business as well as CCOS, and some new CATA members. Many former acquaintances were renewed as families returned to CCOS in Wisconsin and measured to see how the kids had grown since last year! But whatever the conversation among this group, you can bet that before long it has to do with their systems and their re-building, their new equipment purchases, or what they're going to be looking at in the Exhibit Hall during the exhibit hours—this group has one thought on their mind—the improvement of the maintenance and operation of their systems, and that's what this year's program gave them—the **opportunity** for all of that, because each panel had **experts**—people who actuall do these things and know what they're talking about. Not theorists, but **implementers—doers**—actively involved in their area of discussion.

From the survey cards submitted, it would be difficult to pick **the** most popular session because each participant had a special need and looked to that area to fulfill it, and then marked his favorite subject as the best one. **So many were marked the best one that we can't name it.** From the tremendous presentation that Dr.

Well, things are beginning to shape up a little, but then Jack Klinge from UPI is telling MSI's Ivan Curtis and CWY's Terry French how to do it—he's a good organizer (and a most dependable CCOS attendee—Klinge is always the very first to arrive at the site, even before the staff!)

Rodney Bent made on Lightening & Power Surges to the follow-up on Bonding and Grounding by Hansel Mead (Q-Bit Corporation) to the Underground Construction, expertly handled by Wayne Sheldon and the Proof of Performance Testing, presented by the Three Musketeers from Indianapolis (Stelle, Dolan, and Welsh—and they did their usual exceptional job!!!) to the Managements Sessions—all four of them—geared for the women who run those up-front offices for the cable operators, there was an area of interest for everyone, but we still had the problem noted on the survey cards that they wished they could attend **all** the sessions. Many of the sessions were repeated, but some still had a tough time choosing which ones to attend. The Computer Services was noted as a very interesting session, and it was mentioned for further and more **detailed** work next year at CCOS-80 with an actual program set up for the day-to-day operation of a cable system office for billing, etc. The cool breezes outside cooperated for the beginning of the Earth Stations session which began in the parking lot with the erection of the Hughes transportable dish through its construction stages and sighting and testing until the next day for the inside session on testing and alignment. The M.D.S. session was one of the sessions that was repeated due to the high level of interest in this particular subject, and the panel was kept alert by fielding of questions after their presentations.

More about the Management Sessions, **#1, on Reporting and Filing,** conducted by Steve Effros, was a help on that "necessary evil"—**forms;** some of the new-to-the-business cable operators found this extremely helpful as they had been faltering in that sea of forms and reports, and to some of the women who have not had the opportunity previously to hear Steve's presentation on this particular subject, his down-to-earth explanations and approach to this were much appreciated. Many comments were made about the



Now the Exhibit Hall is all set up, and Jim Emerson from Northern CATV is all set up for business and the doors are ready to be opened. An Exhibit Hall all set doesn't tell the story of all the hustle that has gone into it as it is being set up—the drops, running power, overloading, etc.

A full and active Exhibit Hall with the attendees (and we see some wives—but then they know a lot of this equipment too and probably have to okay purchases). From reports, the suppliers did well on the exhibit floor and made good sales plus valuable contacts for future sales.

excellence of the presentation in **Management #2, How To Survive,** presented by Rick Michaels (Communications Equity), and it was interesting to note that during this session (a one-time shot because of Rick's schedule) the crowd was mixed—men and women—it was planned with the women in mind, but the men that attended found the information helpful to their estate planning programs. This was another session that was mentioned for expansion at CCOS-80, and a subject you will see explored in CATJ in future issues. The Marketing Technique session, Management #3, moderated by Smith Murrin (CATV Systems) had a panel-full of "know-how" and this group of experts presented techniques and approaches in marketing that were well received by the large group attending; their questions displayed their interest and search for information in this area. Management #4, or the "Gals' Panel" (God love 'em!) stole the show

Steve Effros, CATA's Executive Director, in session with the Management #1 group on Reporting and Filing; even though this is not an enjoyable part of the business, it is still a necessity and one which garners interest when Steve makes his presentation.

(twice!!) with their Office Procedures presentation—their down-to-earth, day-by-day, this is how you do it type information made the note-pads fill up, cause these gals know what they're talking about and presented some ideas about mundane things like answering the phone, trouble calls, irate customers, forms for work-in-progress (a CATA member called today for one of the ladies phone numbers so he could beg a copy of a simple form she displayed!!), billing, ledgers, cash receipts—all that office procedure that makes your business stay solidified and concise and stable—it was great and the audiences loved it!! They got lots of questions too!!

From the survey cards too we had suggestions for future development of subjects already presented and that more time be given for some of the sessions, such as the underground construction. There is so much material there that it is impossible to crowd it into an hour and a half.

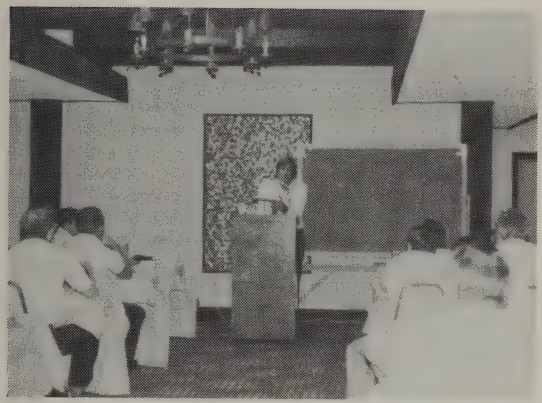
Selman Kremer, Southern Satellite Systems, at the blackboard as his part in the session on Marketing Techniques, which gathered a good crowd. As in most of the sessions, visual aid material as well as display space was available for the use of the panels offering the information.

BUT, also distributed in the participants packets as they registered was a CATJ Reader Survey card (different than the one in the magazine), and from that it was suggested, many times over, that the subjects presented at CCOS-79 be presented as printed material in CATJ for those who were not able to attend the seminar, as well as a better record for those that did. We had already seen that writing on the wall and had taken steps to see that future issues of CATJ would feature some of these subjects, so you can look forward to that in upcoming issues.

A side-trip that was made available, apart from the sessions, was a visit to Lake Geneva (some 10 miles) to the RCA and Western Union twin uplink terminals, and those that attended were thrilled with both these installations and the courtesy extended to them by the staff there. They were patient and answered questions from the group, showing them around their facilities there.

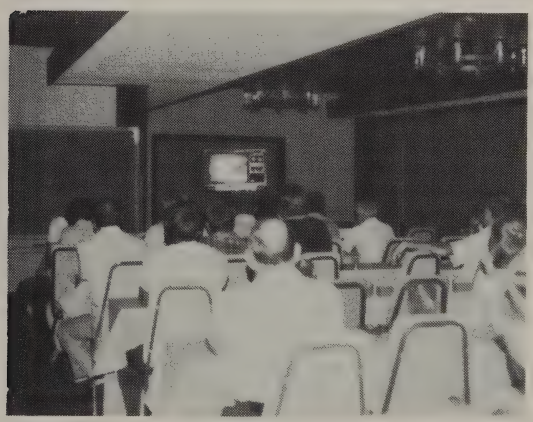
The Management #4 Panel of Gals; left to right, Elaine Donnell, Crestview Cablevision, Prineville, Oregon; Mildred Fox, Fox Cable, Gilbert, W. Va.; Patricia Jolly, Indian River Cablevision, Sebastian, Fla.; and Dorothy Willie, TVIQ, Eagle Grove, Iowa. This panel on general office procedures proved a very informative and popular session, and the men seemed to enjoy learning from these ladies.

Technically, the sessions were superb and the panels were great!! This was the first time that so many cable operators had been involved in presenting these sessions, in cooperation with experts from the suppliers, but this approach was well received and everyone felt satisfied. The Program Committee might have experienced a little difficulty in encouraging some of the cable operators to participate in these programs, because they didn't look on themselves as "teachers", but then who's going to argue too much with Big Ralph Haimowitz or Raleigh Stelle. The program people did a super job, and CATA takes their hat (hard-hat of course) off to them for their efforts in presenting their material and they should feel gratified at the acceptance of their sessions by the participants.

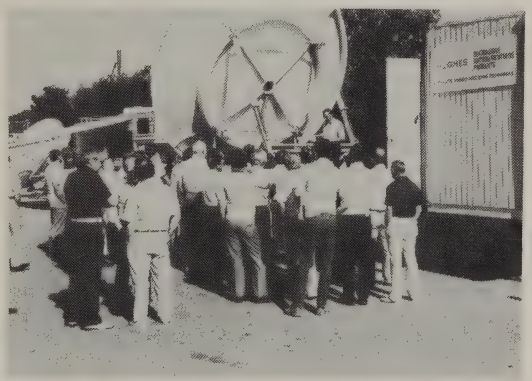


Tom Humphries of Scientific Communications explaining the 10 FOOT earthstation that he brought in on a little trailer hitched to the back of a pick-up which surely was one of the "stars" of this year's CCOS. His discussion was followed by Steve Effros who discussed the licensing of such a dish which will probably sell around $6500-7000 once they are legal.

The Suppliers (and we **do** appreciate them!!) were pleased with the wonderful set-up provided for them in the Exhibit Hall. We will have to admit it was again a departure from the table cloth on a table previously provided, even though it stayed within the concept of a table-top display, but was a U-shaped arrangement with back-drops for signs, larger pieces of equipment, monitors, etc. was provided for 62 suppliers. The floor being carpeted didn't hurt the feet either. We were proud of the Exhibit Hall and pleased with the reception the suppliers got from the participants, and happy to hear of their good results. Granted the numbers aren't as high as at other shows, but dollar-for-dollar, their results are extremely high at CCOS due to the nominal charge made to them for display space and the amount of business they write at this show. The suppliers' group was most cooperative in the set-up, which is usually a **large** pain because of all the last-minute problems that occur—not enough power, throwing circuits, needing a drop, etc.—but we had a most capable leader, Earnie Larson, who handled the Suppliers' Committee and Exhibit Hall masterfully. The Hall was full to capacity and more were on a list in case of a last-minute cancellation—hopefully we will have more exhibit space next year at Snowmass. One new CCOS exhibitor commented after returning to his office that he was very pleased with his exhibit there and that he felt that the **quality** of his **contacts** was extremely high, even though he didn't experience the high number of booth visitors that he is accustomed to at other shows. And that just about says it—at the CCOS exhibits, not only is the technician standing there looking at the equipment, making his decisions about which equipment will work best for him, but he also is the purchasing agent with the company checkbook in his pocket (or his wife's), so it's a much different approach than at the large trade shows. But again, to the suppliers, our thanks go for their cooperation in presenting their wares at our Exhibit Hall—they did a magnificent job of it and it was great to work with them!!!

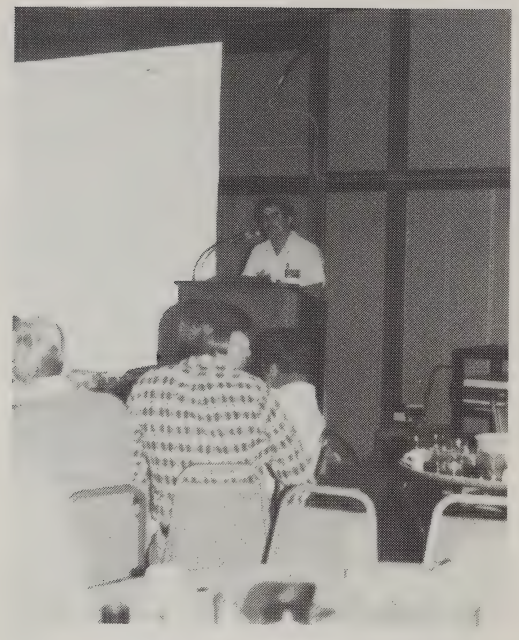


The second session of the Earth Stations Test and Alignment shows the group watching a video tape prepared by CATA Director Carl Schmauder in his system in Lincoln City, Oregon, as they were constructing their earth station. Again, this was a good example of those that had done it so this was of great interest to the spectators.



The crowed assembled outside for the first session on Earth Stations—conducted by Hughes' Marty Plost. This was the first segment of construction of an earth station featuring the actual putting together of this transportable dish and the sighting-in. The second segment dealt with testing and alignment and this earth station information proved to be a very popular subject for the attendees.

Again, a first—the CATA Membership Luncheon!!! And what a success it was. In planning the program, we felt that the group should have an opportunity to hear the very latest about what's going on in Washington (and there's plenty as the CATA-Torial reflects), but we wanted to take advantage of the lunch time to have Steve Effros, CATA's Executive Director, bring the group up to date, which he did with his usual aplomb, leaving time for questions and answers which was enthusiastically used and vigorously fought for—it's hard to keep these



CATA President, Ben Campbell, conducting the General Membership Luncheon prior to the Washington Update given by Executive Director, Steve Effros. A vigorous question and answer period from the members followed with Steve providing the answers. Many suppliers attended as well to keep abreast on the newest in cable legislation and regulation.

guys from talking all at once! Not only did the CATA members attend, but all participants were given admittance, and many suppliers, vitally concerned with the course of the cable business, attended so they would be brought up to date on the latest Washington dealings. The best news of all at this meeting was the "no program consent"—the crowed clapped loudly on that announcement. But the luncheon gave the group a chance to have an open meeting and discuss the problems that face independent cable operators as they search for ways to maintain their businesses, and because of the success of this concept of a luncheon meeting, it will surely be a repeat on future CCOS programs.

The women weren't in sessions all day everyday, but started out with a Ladies Get Acquainted Brunch, sponsored by the CATA Board. Ben Campbell, CATA President, visited the group as they started their breakfast and explained to the ladies about the concept of the program planned for their learning experiences as well as the husbands; he also explained about many of the things that they would be hearing about in regard to legislation, filings, etc. and what CATA was all about and why CATA was. Ileene Abrams from Chicago (the best description is a **"character"**) gave a most delightful program for the ladies, and they all seemed to enjoy it. Keeping in mind all the recreational facilities available at The Abbey, the schedule was

Tom Wheeler, (center) NCTA's new President (official August 1st), met informally with the CATA Board prior to the opening sessions of CCOS-79 to discuss with them the newest on the negotiations that both NCTA and CATA is involved in dealing with Congress on legislation pertinent to the cable industry. CATA Directors Jim Kimrey, left, and Ben Willie, right, joined the rest of the Board in the CATA Suite as Mr. Wheeler joined them prior to the Saturday meeting.

geared so that the ladies wouldn't be overscheduled, but have time for their bowling tournaments, swimming, etc. However, all were interested in the beautiful Lake Geneva boat trip, provided to the ladies by HBO, where they were given a descriptive narrative on the mansions enthroned on the shores of the lake; there was time for them to have lunch in the town of Lake Geneva, do a little shopping and return in time to pick up the younguns who also had been entertained by HBO in the Abbey Recreation Center by turning the place over to them—no quarters were needed for **any** of the machines, foos tables, or bowling lanes. They fed them pizza and hamburgers and entertained them with a clown, so the kids had a ball there and their mothers could go off and have a good time without worrying about them. The ladies got together in the

CATA President Ben Campbell welcoming the Ladies of CCOS to the Annual CATA Brunch, where he discussed the nature of the program and invited their participation in the sessions of their choice and also explained the direction of CATA and what they could expect to learn in some of the sessions.

What a delightful bunch of "bonneted" ladies—this was part of the scarf treatment program brought by Ileene Abrams, Chicago, which highly entertained the ladies and furnished a lot of helpful information.

Crafts area and organized their bridge games and whatever else they wanted to do.

From a social standpoint, there were certainly some highlights—that being the CATA party in that gorgeous 60'x150' red and white tent (now that's a big tent!!!) set up in the parking lot near the boat dock when all came together for hor d'oeurves and drinks plus dancing to two different live bands after the close of the Exhibit Hall; CATA extends their appreciation to the suppliers who donated towards the cost of this extravaganza and thanks them for a wonderful evening at CCOS (a list of the firms is located at the end of this article). This was Tuesday night—then on Wednesday night, the annual CCOS Cocktail Party and Bar-B-Que on the terrace overlooking the lake took place, and what a beautiful night it was—the breeze was just right, the food was **delicious** and **plentiful**, the comradarie superior—everything perfect. But what upstaged the whole thing???? Welsh's boat being towed into the dock with a very vocal group aboard hollering to save them some food. They had broken down in the middle of Lake Geneva!!

The group adjourned to the Casino night in the tent and were provided with an ample supply of "funny money" to use at all the different type tables—crap, poker, black jack, roulette, and the plain old "numbers" game—what a ball everyone had at that—everyone had just a little gambler in them, and it sure came out. They knew their winnings would be used to purchase items auctioned off later, and did that become a riot. Some of the items were vigorously bid for (such as the hand-made cable company purse made by Genevieve Diehl, the large amount of cable that had been donated (how to transport it? Who knows how they did it?), the Florida grapefruit, or the framed picture of the CCOS-79 logo), and the auction was spirited, (contributing companies to the auction are listed at the end of this article) with the auctioneer Ralph Haimowitz being ably assisted by Ed Smith, Raleigh Stelle, Wayne

CCOS-79 did it again! A beautiful spot and setting for the Annual Bar-B-Que on the lawn adjacent to the boat docks at The Abbey on Lake Geneva. It was a perfect night, with gentle breezes, the food was great, and the crowd was happy. A nice night!

The Ladies Program Chairmen (chairpeople?), Kay McConnell and Beverly Rosenberry, relax at the Blackjack table after a busy three days coordinating the ladies activities. The ladies were real pleased with the different events and activities, and Kay and Bev did a super job, so they deserved a little relaxation.

Sheldon, and David Fox—what a crew!!! The accounting wasn't too accurate with the height of the stack of funny money being the determining factor. The crowd sure had a good time, and that's what it was all about, as this provided the climax to the CCOS-79 program as people retired for a good night's rest before their check-out the next morning.

It would be difficult to aptly describe this meeting to anyone who was not present, but if you weren't, you should have been and you would have loved it!! Events such as this just don't happen—it takes hours and hours of detailed planning, anticipating problems, coordinating, telephoning, correspondence, and cooperation. There was a **group** that did all of that, and the overwhelming success of CCOS-79 attests to this fact; from the time the staff rolled into The Abbey, it was a cooperative effort all the

SEE FOR YOURSELF. THE MOST RADIATION-PROOF CABLES IN THE INDUSTRY.

Today, when radiation from drop cable has become a serious concern to many people, Times has taken action to alleviate the problem significantly.

To begin with, we've developed an instrument called the Radiometer which, for the first time, measures radiation definitively. Until now it was anyone's guess. Radiation characteristics were based on relative ratings and not always accurate. But the Radiometer measures capacitive coupling and transfer impedance. The characteristics of the test sample and the test chambers are measured separately. So now we have radiation data that's absolute, accurate and dependable.

Number two and more important, we've used the Radiometer in Research and Development to bring you improved drop cable. How good is the cable? Thanks to the Radiometer, you can see for yourself in the comparative tests shown on the right.

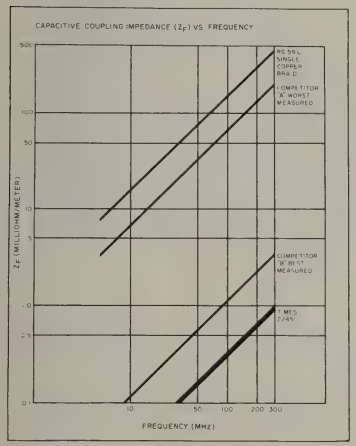
Times 2245, with its sealed foil/double braid construction, is proven to be far superior to every other cable on the market. The best competitive cable (a sealed foil type) was higher in transfer impedance and capacitive coupling. The worst competitive sample we tested was a dry foil construction. And just as a point of reference, we included standard MIL SPEC RG59U, the original CATV drop cable.

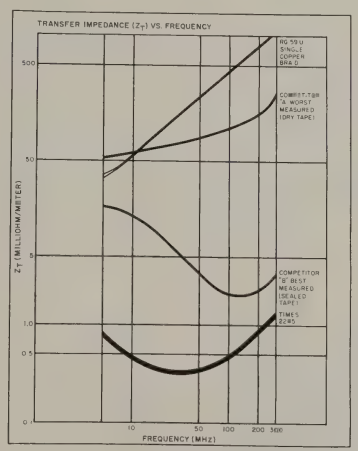
Not shown but also vital is data taken after flexure testing. After many hours of being subjected to simulated severe wind conditions the radiation from one competitor's cable increased by a factor of 40. But the tough construction of Times 2245 kept it from degrading one iota. What's more, we've improved all of our drop cables. Times can offer you cable with the lowest radiation in every price range construction. And this is no idle boast. Radiometer tests prove it.

The Radiometer, however, isn't limited to duty at the manufacturing level alone. CATV operators can utilizes its unique ability to check quality of every reel of drop cable purchased. That's why Times is making the Radiometer Model TNX-247 on a production basis. Selling price: $975.00 including three different size test chambers to cover all RG-59, RG-6 and RG-11 cable.

So now that radiation is such an important issue, there's never been a better time for Times—our Radiometer and our drop cable.

Times Wire & Cable, 358 Hall Avenue, Wallingfora, Ct., 06492 800-243-6904.




TRANSFER IMPEDANCE (Z_T) VS. FREQUENCY
RG 59 U SINGLE COPPER BRAID
COMPETITOR "A" WORST MEASURED (DRY TAPE)
COMPETITOR "B" BEST MEASURED (SEALED TAPE)
TIMES 2245
Z_T (MILLIOHM/METER)
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CCOS-79 HIGHLIGHTS

PRESIDENT CARTER SENDS MESSAGE TO CCOS

The message below was sent to CATA Executive Director, Stephen R. Effros, to be read at the CATA General Membership Luncheon, July 17th:

I am glad to extend greetings to the Community Antenna Television Association. Resolution of the complex issues facing this Nation require an informed electorate. Cable television, with its wide selection of channels and services, can make an important contribution to the debate needed to thoroughly examine these issues. Your success rests on your ability to serve your local communities and thus the entire country.

I commend your industry and the small cable operators for the strides you have made and urge you to take advantage of the new opportunities in programming services and new technologies to make television live up to its early promise as a medium of information and cultural enlightenment as well as entertainment. My Administration, in turn, will do all that it can—consistent with the public interest—to eliminate inappropriate restrictions that hamper the free flow of ideas.

Please accept my best wishes for a successful Convention at Lake Geneva.

Jimmy Carter
President of the United States

A WORKING THREE METER EARTH STATION AT THE SHOW

This year one of the "stars" of the show was a 10 FOOT earth station that Tom Humphries of Scientific Communications brought in on a little trailer hitched to the back of a pick up truck! Just drove right up and plugged it in! Not only did it work, but the pictures were almost indistinguishable from a 4.5 or 5, or 6 meter dish—almost. Now we were not in the "hottest" part of the footprint, and, as Tom pointed out in one of the panels, it is likely that if we were, you would not have been able to tell the difference between his little 10-Footer and any of the bigger dishes in ANY way. It was very impressive, especially since he said a 10-Foot dish package will probably sell for about $6500 to $7000 once they are legal.

FIBER OPTICS WAS AT THE SHOW TOO

This time it was the combined efforts of Times Wire, Microdyne, Avantek, and Gardiner Communications that put together a fiber optic link from an earth terminal out in the parking lot to the exhibit floor. The fiber itself was so small that you had trouble seeing it, but there was no trouble seeing the pictures it brought in—they were beautiful. So beautiful, infact, that an entire package of signals, including HBO, SHOWTIME, and UPI News, as well as WTCG and CBN were hooked into the Abbey's master antenna system. The hotel folks were so impressed they are talking about getting an earth station themselves!

SATELLITE PROGRAMMING—MORE TO COME

Our friends from HBO, SHOWTIME, ESPN, C-SPAN, UPI, AP, WTCG, the Turner Cable News Network (CNN), WG, Nickelodeon were **all** there, and they all had one thing in common—they were talking about more programming via satellite. Many of the CATA members and attendees were also talking to them about contracts and the like. Many of these people attending CCOS-79 may not yet have an earth station, but they are **about** to get one, and as prices and sizes continue to come down, there will be more of an increase, so therefore the added programming is an important factor in selling this concept.

Looks like Dave Alvarez of Microdyne was a big winner—but no!!! The next hand he lost it all, but he was winning big for a while at the Blackjack table at CATA's Casino Night.

way. Peter Athanas, CATA's General Convention Chairman, had taken care of local arrangements with the apt assistance of his Office Manager, Carolyn Knop, and his Chief Technician, Kurt Bester, and their efforts were invaluable. The set-up crew was then assembled, and after the Board of Directors meeting, they adjourned to the Exhibit Hall where they could be spotted in jeans and work clothes, crawling around, making the necessary electrical adjustments that had to be done prior to the suppliers' moving in. The CATA Directors were everywhere—hopefully you had an opportunity to visit with them—they were identified with special CATA Directors badges—and could be found on the Exhibit Floor, in the sessions, and yes, even on the dance floor!!! The **spearhead committee,** in cooperation with the Oklahoma City CATA Office Staff, was

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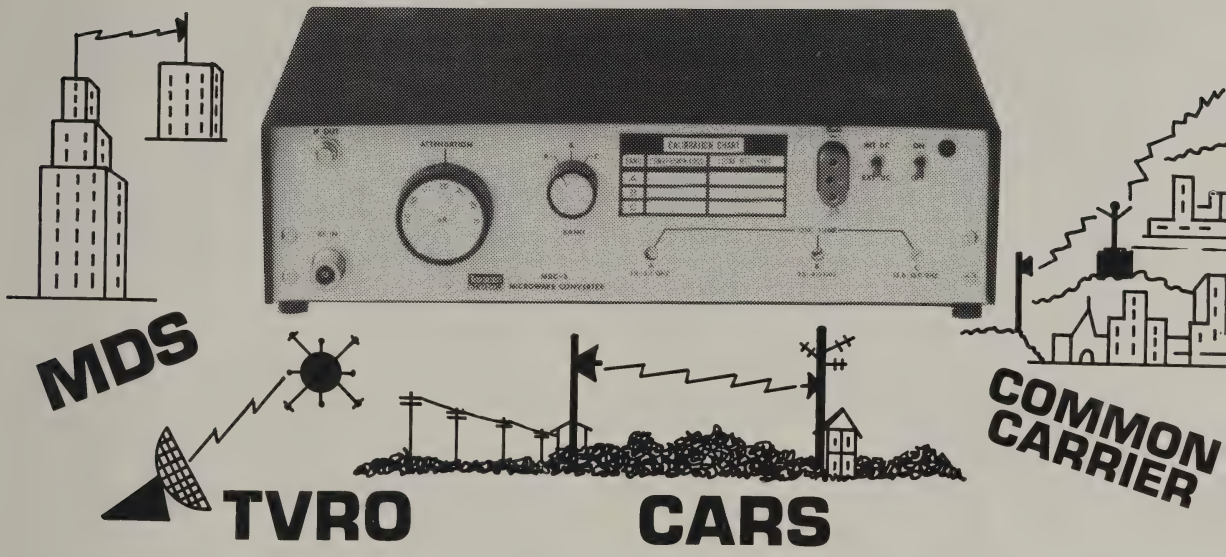

Texscan's microwave down converter permits measurement in the MDS (2.1 GHZ) TVRO (3.7 GHZ) and CARS (12.7 GHZ) band with existing VHF test equipment. Spectrum analysis, signal strength and even microwave sweeping are possible with the MDC-3.

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CATA wishes to acknowledge the following suppliers for their donations towards the Tuesday night party at CCOS-79 and extend our appreciation for their generosity:

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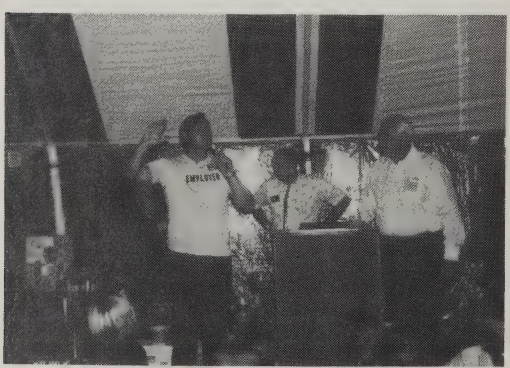
Toner Cable Equipment, Inc.
UPI
Van Ladder, Inc.

composed of Earnie Larson and Raleigh Stelle, CATA's Associate Director and Vice Director respectively, and Ralph Haimowitz, CATA's Director from District #4, and the responsibility was placed in capable hands because they had covered all the multitude of details to make this whole thing work. Assisting them during set-up, in addition to the CATA Officers and Directors, were Ed Smith, CATA member from New York (he comes early **every** year just to help us set up, because he enjoys it—strange, but true, because it's **not** fun by any means) and our dependable Tony Bickel, Afton, Okla. who just kinda scratches his head and helps us figure it out! Bouquets to these people!!!!

The aftermath of such a meeting is that it's hard to come back down to the day-by-day living and operating that's necessary after such a build-up. We hope that if you attended, you realized something worthwhile out of this. James Nelson, all the way from 18-hours of flying from Guam, said **one** day was worth the flying time, and he certainly would be in Colorado next year. And we hope you will too. Prices will be better on hotel accommodations (that's cheaper!!!); the weather will be an asset again 'cause **summer** in **Snowmass** is de-e-e-e-elightful!!!! But the program???? We have the survey cards from this year's attendees, but if you have a request, let us know, and soon, because the committees will be formed right away to begin work on CCOS-80, and we want to have a program for **you**. You can be assured that your input will be useful as the program is planned, as can be demonstrated by the return to the hands-on type program for this year's program as was requested. Let us hear from you in regard to your requests.

Again, thanks for participating in CCOS-79 if you were there; we enjoyed having all of you. If you weren't able to attend, we wish you had because we think it would have been a meaningful and helpful stay for you.

But now, upward and onward. . .think SNOWMASS FOR 1980!!!!



AUCTIONEER EXTRAORDINAIRE Ralph Haimowitz and his very capable ringmen, left to right, Ed Smith, David Fox, and Wayne Sheldon, getting the auction sale underway. The other ringman, Raleigh Stelle, was in the crowd collecting one of the "stacks" of money as Ralph was declaring. . ."going once, going twice. . .SOLD!!!"

CATA wishes to thank the following firms and individuals who donated items for the CATA Auction at CCOS-79:

CATJ Magazine
Clown Electronics
ESPN
CWY Electronics
Genevieve Diehl
GTE Sylvania
Ralph Haimowitz
Larson Electronics
MCE Corporation
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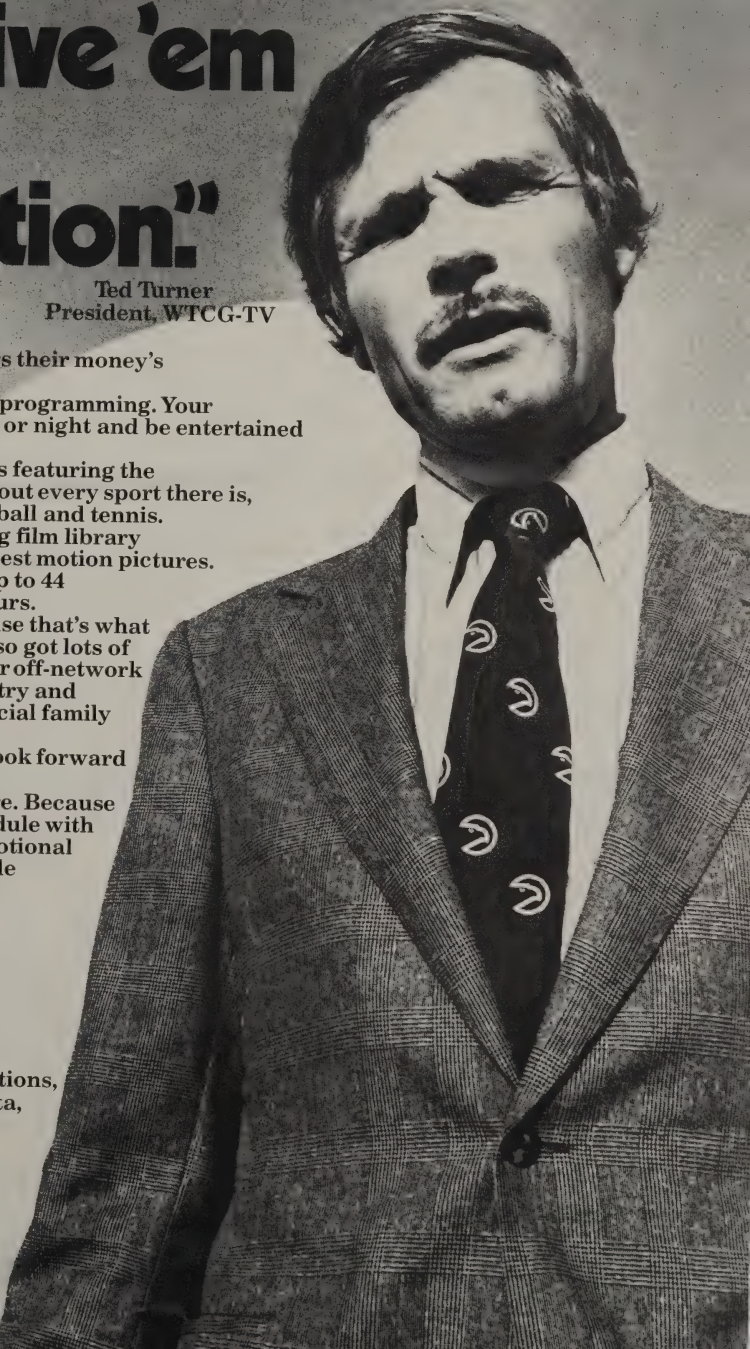

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CALTEC EXPERIMENT WITH MODIFIED CONVERTER SHOWS BIG IMPROVEMENT IN PICTURE QUALITY

By: James B. Wright
Engineering Manager
Caltec Cablevision

When Caltec began CATV operations last September, we found that our goal of "perfect pictures" again was frustrated by an old enemy —the inability of most customer TV sets to reject adjacent channel information adequately.

This interference problem is threefold. First, the upper adjacent visual carrier appears as a "busy" background, that is, as course noise, on the screen. Second, the lower adjacent aural carrier appears as a 1.5 MHz herringbone pattern. Third, the lower adjacent color carrier appears as a 2.42 MHz contoured pattern, drifting through the picture. The presence of these adjacent channel interferences requires critical adjustment of the TV receiver's fine tuning control to minimize the interference for the best picture possible.

Since cable system operators began using 12 or more channels, video and audio interference from adjacent channels has played havoc with television picture quality.

Calvert TeleCommunications Corporation in Baltimore, Maryland, hoped to reduce this adjacent channel interference in its new 1600-mile system. With engineering assistance from CATV Division of Oak Communications, Inc., in Crystal Lake, Illinois, Calvert devised a very effective 'fix."

The following story summarizes the results of Caltec's experiment with a unique triple-trapped converter that greatly improved picture quality where it counts most—in the customer's home.

Our engineers determined that a converter could provide increased channel selectivity to the receiver if its output channel frequency were held to closer tolerances at the time of manufacture, and if additional trapping were provided at the three adjacent channel carriers.

Because the Oak Trimline II, a 35-channel converter, already had built-in adjacent sound and picture traps, as well as automatic frequency control, we asked Oak engineers to modify the unit by adding a lower adjacent color trap.

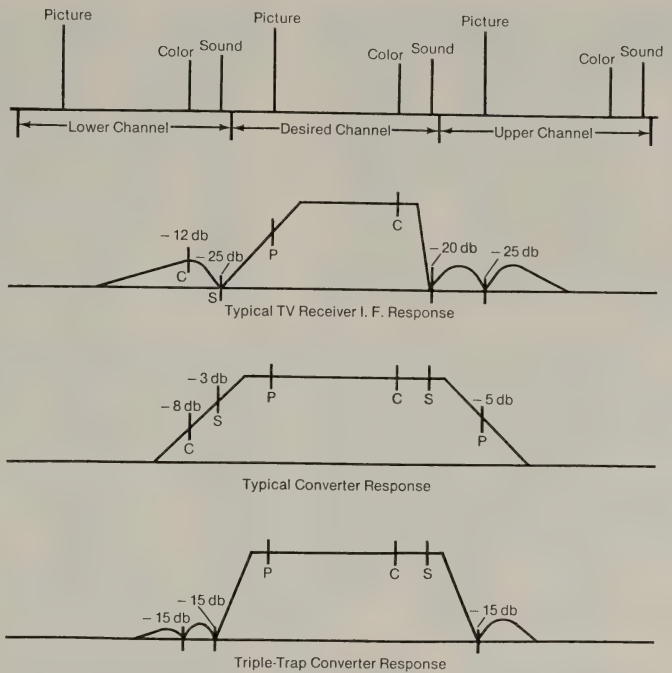
The new custom-designed triple-trapped converter provided rejection levels of -15 dB for the upper adjacent visual carrier, -18 dB for the lower adjacent aural carrier, and -20 dB for the additional lower adjacent color carrier. (See Figure 1).

To test the effectiveness of the triple-trapped converter, last December we conducted a one-week survey of 107 cable subscribers selected randomly. We compared the modified converter with a high-quality non-trapped converter. A splitter to feed the two converters and a coaxial switch to feed the TV receiver were provided to enable a quick back-and-forth evaluation of effects.

Caltec technicians then tested both converters for levels of rejection of the three types of interference, as well as the degree of ease in operating each converter's fine-tuning mechanism.

Survey results showed that over 88 percent of TV sets evaluated suffered from multiple

Caltec Triple-Trapped Converter Response Comparison



The above curves show why a triple-trapped converter is necessary and why it works. The typical TV receiver does not remove adequately either the lower adjacent sound carrier or the upper adjacent picture carrier, and makes no attempt to trap out the lower adjacent color carrier. The untrapped converter helps this adjacent rejection slightly, while the triple-trapped converter does for the TV set what it should do for itself.

FIGURE 1

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Caltec Converter Survey Test Results

Test	Rejection Level Rating	Non-Trapped Converter	Triple-Trapped Converter
Adjacent Color Interference	None	16.5%	98.0%
	Light	78.6	2.0
	Medium	4.9	0.0
	Heavy	0.0	0.0
Adjacent Sound Interference	None	8.4	96.3
	Light	80.4	3.7
	Medium	10.3	0.0
	Heavy	0.9	0.0
Adjacent Picture Interference	None	10.3	74.8
	Light	70.1	24.3
	Medium	19.6	0.9
	Heavy	0.0	0.0
	Ease of Control		
Fine Tuner Control	Very Easy	10.6	78.8
	Easy	72.1	20.2
	Difficult	16.3	1.0
	Very Difficult	1.0	0.0

Figure 2

adjacent channel beats and difficult fine-tuning. But, by using the triple-trapped converter, we reduced the overall level to 13 percent. In fact, use of the modified converter showed results ranging from six to more than 11 times better than use of the non-trapped converter.

As can be seen in Figure 2, use of the modified converter eliminated the adjacent color carrier 98 percent of the time, compared with a 16.5 percent rating for the non-trapped converter. The remaining two percent of TV sets using the converter registered light adjacent color interference, while the non-trapped converter failed to eliminate interference in more than eight out of 10 TV sets in homes surveyed.

Results of the adjacent channel sound test revealed the greatest discrepancy between converter performance levels. The triple-trapped converter eliminated 96.3 percent of adjacent sound interference, thus scoring a performance level more than 11 times better than the non-trapped converter. Less than four percent showed light adjacent sound interference using the triple-trapped converter, while more than nine out of 10 registered light, medium, or heavy interference with the other unit.

In the third category, we tested for adjacent channel picture interference. Almost three out of four sets evaluated with the modified converter showed no interference, with the remainder showing mostly light interference. This

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compares with the non-trapped converter failing to eliminate interference in almost nine out of 10 sets, and 70.1 percent registering light interference.

Finally, the triple-trapped converter allowed "very easy" fine tuner control in 78.8 percent of sets, while the non-trapped converter showed 10.6 percent in the same category.

In summary, our survey results proved that use of the custom Oak triple-trapped converter greatly improved the video quality on the average home TV receiver, allowing us for the first time to deliver to the picture tube the quality we had been delivering to the terminals of the receiver.

Total Reliability

LET'S TAKE ANOTHER LOOK AT RELIABILITY

By: Allen Shaw, Mgr.
Communicable of Palmetto
Palmetto, Florida

Having been asked to participate in a panel discussion concerning system reliability, I collected my thoughts on the subject from personal experiences with system reliability over the past eleven years, and realized that although everyone is well aware of the importance of reliability in any cable television system, it is one of those items that is too often taken for granted, and everyone in this industry should keep **reliability** as the **most** active action item in their operation. We all have a tendency to address individual problems as they arise. At the heart of every aspect of cable operation is reliability and, if we spent more time looking at our reliability, we would be able to prevent many of these individual problems from happening.

Today's cable television system, with its advanced electronic capabilities, combined with the multitude of extended services, places a tremendous burden on the system to obtain and maintain what I refer to as "**Total Reliability**".

I have divided the topic of System Reliability into three categories: **Plant Reliability, Personnel Reliability,** and **Billing Reliability.** Each represents a very important function of your system. When combined, they are a standard by which to measure your system's "**Total Reliability Factor**".

PLANT RELIABILITY

The old cliche, "**You can't see the forest for the trees**", often becomes an oversight to system operators. We all, and I mean system managers to installers, assume that our customers understand or comprehend our problems—cut cables, power outages, atmospheric conditions, or equipment failure—when in reality all the customer knows is that he or she is not receiving the product they are paying for. So you ask yourself, how do I insure myself that my system is reliable?

I believe reliability begins with the initial construction of the plant. **Research** where you are planning to build. Do you have an excessive corrosion problem? Are you building in a lightening prone area? Does your city or county have immediate or long range projections of possible water and sewer replacement or extensions that could affect your plant a few years down the road?

These are just a few of the problems that, should they be overlooked, they will come back to **haunt** you.

The old saying, "A penny saved is a penny earned" is generally true; however, when you demand of your system reliability, those few pennies saved may end up costing you ten times over.

With the advancements we have seen within just the past few years in coaxial cables, electronics, and stand-by powering, a cable operator can easily assure himself that his system will afford him a relatively high reliability factor.

First, take into consideration, that your construction crew handled and built the plant utilizing proper construction methods and, second, that your system has the competent well-trained personnel to maintain it.

This brings us to the second reliability factor a system operator must consider and that is **PERSONNEL.**

PERSONNEL RELIABILITY

Without competent, well-trained engineers, technicians, and installers, the system's reliability factor would dwindle. To date, the cable television industry is one of few that educates their technical personnel through on-the-job training practices. Many of us began at the bottom, and, through determination, hard work, and long hours, have attained one form or another of either system ownership or management. I have found that employees with college electronics training or previous telephone communications experience find that their training is somewhat helpful to them in grasping the technologies of our industry, but not nearly to the extent that they had **anticipated.**

With the introduction of satellite programming, the potential market place for our services has grown by leaps and bounds. Many job applicants, within the employment market, are highly impressed by our industry and are actively seeking positions within it. How we, as system operators, handle their introduction into our industry, will determine our system's reliability.

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BILLING RELIABILITY

The third reliability factor I wish to mention is that of our front office function—**billing and records.** In years past, the manual billing cycle was relatively simple and adequate for most systems, regardless of their size. However, in today's market, with various levels of services available to our customers, the burden of prompt and accurate billing and records proposes a problem to all of us.

Operating a system in Florida is unique in itself compared to most other areas of the country. Here we enjoy the year round living Florida offers, but, at the same time, this tourist oriented state produces the problem of excessive customer **turn-over or churn.**

Recently I heard a guest speaker who represented a local realtors association, and was amazed at his information concerning the length of occupancy of a home in Florida to that of other states. We were told that a typical Florida family moves or relocates once every three to five years, as compared to once every eight to twelve years for families living in other states.

With this built-in factor of customer churn, and the factor of your own particular region in regard to customer turn-over, along with transients and seasonal visitors, coupled with the extended services systems offer today, the burden placed on the cable operator to maintain an **accurate** and **prompt billing** process, as well as statistical records, is **absolutely staggering.** My personal observations have shown me that an incorrect bill, a misapplied credit, a tardy pay TV guide, or worse, none at all, is just as aggravating to a customer as a reception complaint. Your front office **has** to be able to satisfy these aggravations, answer the customer's questions to their satisfaction, and provide the good-will and "PR" for your cable system—your front office is vital!!!!

SUMMARY

In summary, your system reliability is made up of: PLANT, PERSONNEL, and BILLING AND RECORDS. As system operators, you should take a good, hard look at your individual systems, and **honestly** evaluate their overall reliability. Repeatedly, we have heard about all the attributes that are available to our industry which would increase our bottom line—converters, pro-cable legislation, super-stations, etc. But **STOP** and **THINK.** It's like the old cliche— Don't put the cart before the horse!!! We can have all the deregulations—we can have all the softwares—we can have all the superstations—but without the single most important item—**RELIABILITY** —we will have nothing! Check your system out and see what you find!!!.

CATJ Repeats...

CATJ is appreciative of the good response to our Reader Survey, and, as a result, we had many requests for repeats of articles from past issues. Those subscribers who have not been able to get all the back issues since the first issue of CATJ (May 1974) have been most encouraging for re-runs of some of the construction and antenna articles, as well as head-end receiving situations, system lay-out and design, and much, much more. We will be running some of these in subsequent issues, beginning with the one below. If you did not fill out your Reader Survey card from the July issue, we encourage you to take advantage of this opportunity in this issue, as we want to be able to furnish this timely and useful information to those who may have just recently joined us as a subscriber to CATJ.

From CATJ October, 1975

MULTI-MODE RECEIVING ANTENNA ARRAYS REDUCE SCATTER REGION SIGNAL FADING

Brave New Worlds

For as long as there has been a commercial-television transmitting-and-receiving industry, there has been horizontal polarization of television signals. The decision to radiate television signals horizontally, with respect to the earth (Diagram 1), resulted from a series of tests conducted by RCA (and others) in the 1930's.

There were no set rules about wave polarization in the 30's when the first television experiments began in cities such as Milwaukee, Los Angeles, and New York. And a study of the literature of that era reveals that many years of industry-sponsored (in the main RCA) tests sought to learn whether the new "ultra-high frequency" transmissions (anything about 30 MHz was considered "ultra" in those days) propagated better when vertically or horizontally "sensed."

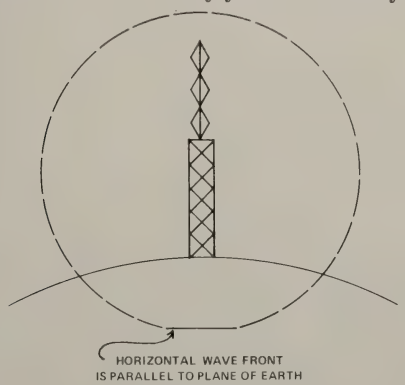

DIAGRAM 1

When the FCC adopted rules and regulations for the first commercial television service, and the first stations became operational in the early 1940's, the polarization chosen for the United States was horizontal. Slightly earlier, the British had adopted vertical polarization.

The "polarization argument" has never really been settled, simply because for all practical purposes *there is no argument.* Under certain conditions, each exhibits advantages over the other. Vertical polarization appears to fill in (i.e. more signals in dead spots) in regions in close to the transmitter (i.e. within our Grade A region); while horizontal polarization appears under most circumstances to exhibit better far-region coverage; i.e. in our far Grade B regions. But these are *not* hard-and-fast rules, and there is *no one clearly superior polarization mode* for the transmission of television signals to large geographic areas.

Most often vertical polarization has been associated in North America with two-way communications, where omni-directional transmitting patterns are necessary to transmit intelligence from one central "base station" to mobile units which may at any instant be located in virtually any

direction from the base station.

We have not done badly with horizontally polarized waves; we would have done probably about as well if the choice had been vertical as in England. And the subject has therefore received little attention from researchers in the interim.

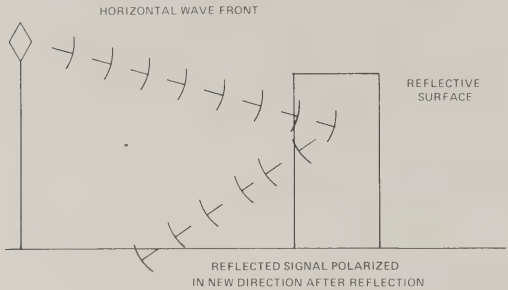

DIAGRAM 2

However, in the 1950's there was a small flurry of interest in both polarization modes when various IRE (later IEEE) study groups revealed that polarization of wave fronts at VHF (and UHF) are not sacred; *that under some circumstances* wave fronts which depart the transmitting antenna in one mode (i.e. either horizontal or vertical) may arrive at some distant point *skewed or twisted.* See Diagram 2. After suitable study of the phenomenon, it was determined that *obstacles encountered* by a wave front along the transmission path have the capacity to repolarize the wave front. Such obstacles, it was learned at the time, could be physical and obvious (a tall building or a range of mountains), or they could be "invisible" and not so obvious. But at that point the study was dropped, except in military applications where new types of transmitting-and-receiving antennas evolved to "take advantage" of the new information.

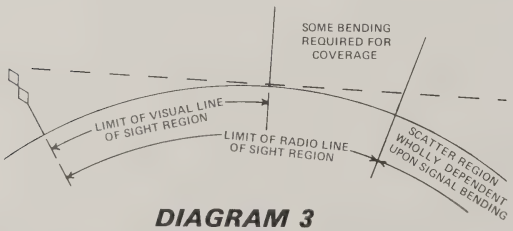
SOME BENDING REQUIRED FOR COVERAGE
LIMIT OF VISUAL LINE OF SIGHT REGION
LIMIT OF RADIO LINE OF SIGHT REGION
SCATTER REGION WHOLLY DEPENDENT UPON SIGNAL BENDING

DIAGRAM 3

Of particular interest to us, in the television-receiving industry, are the "invisible" repolarization mechanisms. They are most apparent on relatively long paths (i.e. those that *begin at the visual horizon* and stretch outward into the radio horizon region—for whatever distance the radio horizon region can be stretched by the receiving-system designer). See Diagram 3.

It was apparent with IRE-sponsored studies in the 50's and in subsequent studies, that repolarization of a wave front (horizontal in our case) takes place primarily in two regions of interest to us. In regions very close to the transmitter, where signal levels are very strong, repolarized wave fronts occur when the horizontal wave front encounters an obstacle such as a tall building, and in the reflection-from-the-building process the wave front "skews" or "twists" on its axis, ending up polarized other than horizontal. There is nothing magic about horizontal or vertical polarization; both are merely *way stations* around the point of the compass, and in one-degree increments there are 360 such increments or way stations. Which is another way of saying that if horizontal polarized wave fronts are assigned a mathematical number that corresponds to the plane of the wave front as that wave front "cuts through a circle," it would not be called horizontal; it would be called *90/270 polarization.* Or vertical polarization would be labeled 0-180 polarization. See Diagram 4. Many other variations are possible, for example 45/225.

Now it happens that in addition to physical encounters that cause repolarization (see Diagram 2), there are "invisible encounters" that cause the same effect. These invisible encounters *can* take place at virtually *any point along the path* from the transmitter to the receiver, and in fact do. But their impact or noticeability is *most apparent* in those regions along the transmission path which are located beyond the visual line-of-sight range. See Diagram 3.

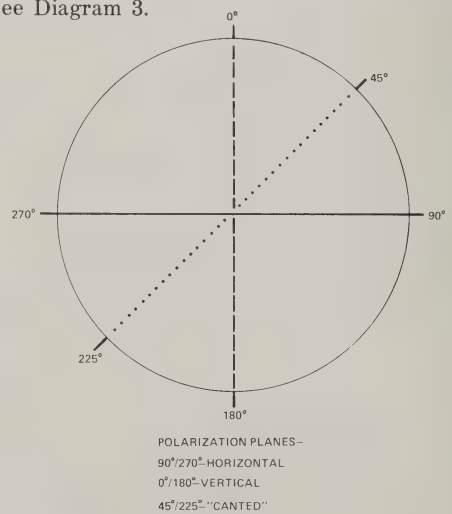

DIAGRAM 4

The propagation of signals in the VHF/UHF spectrum region *beyond the horizon* (i.e. *further out* from the transmitter than line-of-sight will reach) is due almost entirely to a propagation mechanism known as "scattering." Scattering of wave fronts is best explained by the thesis that wave fronts encounter, in the scatter region, small, localized areas of the lower atmosphere (i.e.

ground level up to a few thousand feet) which are concentrations of moisture or pockets of hotter than surrounding or colder than surrounding air. These small pockets or concentrations of moisture-different or temperature-different air are constantly in motion (i.e. they are not stationary in location). A wave-front path that has an encounter with one such concentration one instant will find no such concentration at the same point along the transmission path seconds thereafter.

And these pocket-concentrations have the ability, because of their localized concentration of signal-reflection (or refraction) components, to cause a wave front entering or passing through to bend and twist. In effect, a wave front passing through such a "globule" exits often slightly (considerably) repolarized. In an *extreme example*, a 90/270 wave-front signal would exit the globule concentration as a 0/180 wave-front signal.

This whole thesis depends upon the presence, along the transmission path from transmitter to receiver, of *pocket concentrations* of *moisture globules* or *temperature globules*. And it depends upon an *absence* at the receiving location of any *direct* path signals (i.e. line-of-sight signals), because line-of-sight signals tend to be considerably *stronger* than scatter-range signals, and the scatter-range signals propagated along the path by globules are masked (i.e. covered up in signal-strength level) by the stronger line-of-sight signals.

So once the CATV system is functioning in a scatter region (for one or more channels), it is evident from tests conducted that for a high percentage of the time the signals presented to the receiving antennas by the scattering mechanism are badly skewed in polarization. What began as a 90/270 wave-front signal may at any instant point in time be considerably different from 90/270.

To complicate the situation, scatter-region signals arrive at the distant receiving station along a multitude of *different* signal paths. Not all signals arrive at the receiving antenna by traveling the *shortest distance* from transmitter to receiver. Many are arced in flight (see Diagram 5), and others are received at the receiving location along a billiard-ball type of reflection path. When *two or more* signal paths are present, there is some *phase* (i.e. time) *delay* between any two of these that have followed differing paths to the receiver. The phase or time delay is seldom so *extreme* as to cause visible receiver-screen ringing (i.e. ghosts), or if there are ghosts on a rapidly fading signal, they are transitory in nature, appearing only for brief instances (example of extreme ghosting due to multiple paths . . . airplane reflections). But whether the signals display ringing (ghosting) on the receiver screen or not, the phase imbalance has a dramatic effect on the *signal levels* present. Only in-phase signals *add together* to produce increased signal voltages. Or, out-of-phase signals, depending upon the extent of their phase difference, create varying amounts of attenuation in the summed signals when both (or all in the case of

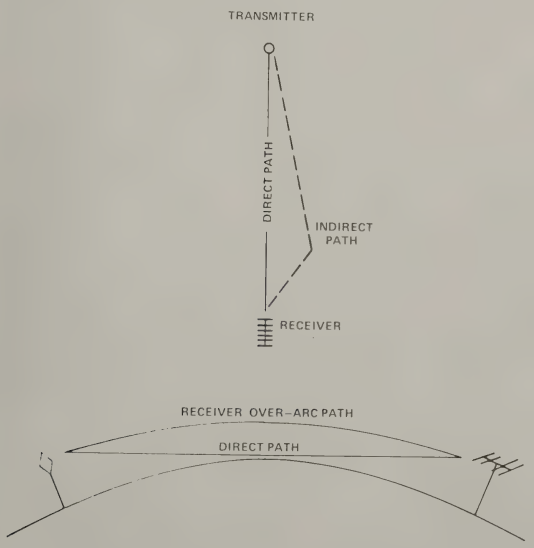

DIAGRAM 5

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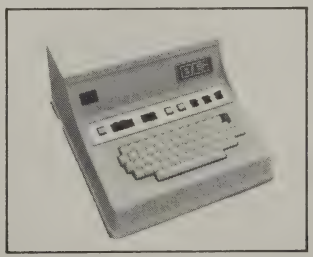

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more than two) differing phase signals arrive at the receiver-antenna terminals at the same time.

Therefore in the scatter regions we have two factors working *against us* when we attempt to create viewable pictures for our system subscribers. (There are actually many more than two factors, but for now they will suffice.) The signals are being repolarized by globules; signals are arriving at the receiving antenna over multiple "scattering paths," with some degree of phase imbalance between them so that at any given instant they may sum in phase or attenuate out of phase.

Vertical vs. Horizontal

If the 90/270 wave front maintains the *majority* of its integrity in flight out to the scatter region (beginning at the point the line-of-sight point leaves off) and loses its 90/270 polarization only *some* of the time in the scatter region, what would happen to the receiving signal *level* present at the CATV headend if *two sets of antennas* were installed, one horizontal (90/270) and one vertical (0/180)?

Back in the line-of-sight region, and especially in close to the transmitter (such as in the Grade A region), if you merely take a horizontal antenna and flip it up on its side (i.e. turn it from 90-270 to 0/180), the signal level present will drop from 20-35 dB. In *theory*, it will drop something in excess of 30 dB, but in practice we have ground reflections, tower reflections, and other physical factors which have (in our local antenna site region) already repolarized some of the signal present. To obtain a true maximum *cross-polarization* differential (30+ dB), the antenna would have to be well elevated above ground in virtually free space where no localized ground reflections or repolarizations cause any skewing.

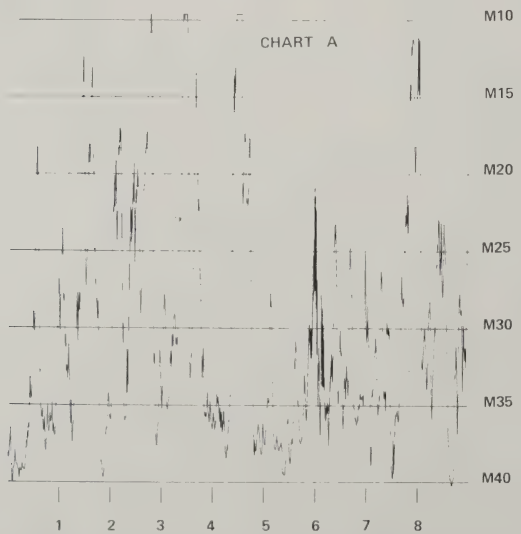


CHART A — Typical beyond-horizon tropospheric scatter signal (high band in this case) shows 30 dB plus fade range of received signal. Horizontal scales are in dBmV levels related to preamplifier input; vertical time marks are at one minute intervals.

The same is *not* altogether true in the scatter region, primarily because a fairly large portion of the scatter-region signal is skewed in *as-received polarization* by the globule propagation mode along the path. Therefore, under conditions of high fade rates (i.e. many fades per minute), it is logical to *assume* that for *brief instances* the vertically polarized (0/180) antenna *would exhibit* substantial amounts of signal at its antenna terminals—perhaps even exceeding those present on the horizontal (90/270) antenna, *for that instant.*

Fade Signatures

To better understand the nature of the "disease," it is helpful to look at our symptoms. With the aid of a chart recorder attached to an SLM, this can be done quickly and conveniently.

Chart A shows a typical fade situation as received by a scatter-region receiving terminal under normal conditions. Normal is defined here as those conditions which exist a majority (more than 50%) of the time.

Note on Chart A that the fade signature is "pumping" in nature; that is, the received signal voltage varies widely in a highly modified sine-wave format. Maximums and minimums are indicated, which in turn reveals the *fade range.* These signals, on a scatter-region (i.e. distance) highband (VHF) signal, are typically representative on fading signatures on a horizontally polarized (90/270) receiving antenna when the transmitted wave front is also 90/270.

It is also useful to see a receiving condition such as this "clear itself"; that is, with the assistance of a *friendly* transmission medium, see how the transition from "scattering" to enhanced tropospheric bending looks. Chart B illustrates. Note that leading into the more stabilized signal levels (enhanced levels), the scattering mode appears as it does in Chart A. However, when the turbulence in the atmosphere slows down (i.e. the atmosphere *stabilizes*), *the effect of the globule propagation mechanism diminishes* and is masked by the extended range of the direct path (non-globule) signal. This sort of enhancement takes place when weather fronts provide enhanced signal levels, or

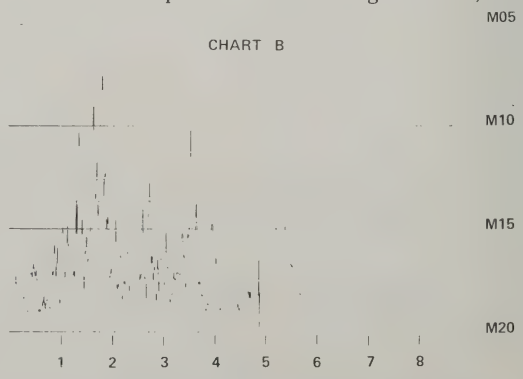


CHART B — Typical transition (at 5 minute mark) from tropospheric scatter propagation to tropospheric-stable propagation mode. Note fades do not abruptly disappear, but fade rate does stabilize as wave front polarization stabilizes.

the normal morning-and-evening heating and cooling process of the atmosphere provides short-term signal enhancements (see *September* and *October CATJ, 1974*).

In an enhanced-signal situation such as this, the important thing to remember is that globule propagation via globules) either ceases because of *stabilization of the globules*, or their impact is *masked* by the enhancement of the direct (non-globule) mode of transmission.

Chart C depicts the same globule enhanced or mode signal as received on a vertically polarized (0/180) receiving antenna. Note that for *brief* periods of time during the span of the chart, there is considerable enhancement of the signal level present on the 0/180 antenna. These enhancement periods are directly attributable to the *brief* intervals when the 90/270 polarized signal finds itself more *closely* 0/180 than 90/270 at the receiving site.

However, because the signal via the globule mechanism arrives at the receiver over a multitude of wave paths (i.e. paths direct and arced), it is *not* necessarily true that when the indicated signal on the 0/180 antenna is *high* the signal on the 90/270 antenna is *low*. It *can* happen, but it is not a certainty and is probably more in the nature of chance than probability.

The Chart C signal level averages far lower than a corresponding level would from a 90/270 receiving antenna, simply because the polarization sense of the *original* signal is 90/270; and any *deviation* from 90/270 always *starts off from* the 90/270 base or point of reference. Ending up at 0/180 is merely a way station or stop along the way, one of several hundred discrete way stations present.

It should be noted that a 90/270 antenna plane does not stop working for an 89/269 signal, or even a 60/240 signal. As the plane of polarization twists *away* from the plane of the receiving antenna (i.e. the sense changes), the fixed 90/270 antenna simply becomes less and less *efficient* as a resonant collector of signal. The *ultimate inefficiency* occurs when the two planes are *cross-polarized*, that is, a 90/270 antenna plane and a 0/180 signal plane. In *between* the two extremes, there are varying amounts of antenna-signal-voltage-capturing efficiency exhibited by the receiving antenna.

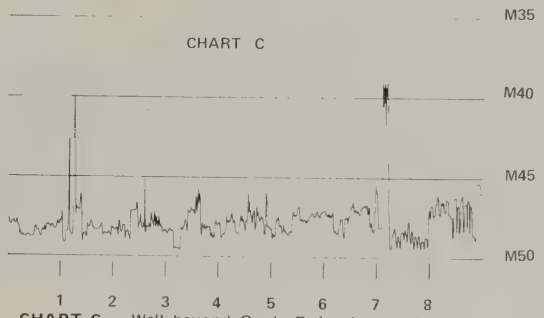


CHART C — Well beyond Grade B signal as received on cross-polarized antenna array (stacked vertically polarized Yagi-Uda antennae); note abrupt enhancements at 1.25 and 7.25 minute marks, denoting received front polarization "shift" to more vertical mode.

Continued In Next Month's Issue...

TECHNICAL TOPICS

RECEIVING BRITISH TV by S.J. Birkill

OK, so it's not got a lot to do with CATV, or satellites. But once every 11 years, at the peak of the solar activity cycle, frequencies as high as 40, 50 or even 60 MHz find themselves reflected over trans-oceanic distances by the enhanced level of ionization of the F2 layer. I guess it could be just a headache, patterning the channel 2 off-air feed like summertime sporadic-E, but this coming winter (when ionospheric propagation for HF signals is at its height anyway) will coincide with the peak of sunspot cycle No. 21 (as officially designated) and some quite unusual things will be happening at the low end of our familiar VHF spectrum. It could be interesting to take a look, as the chance will not come again until around 1990, by which time there may not be much TV around at low band VHF, in Europe anyway.

London has, since just after World War 2, been provided with its television service from the Crystal Palace transmitter, to the south of the city. For historical reasons, its VHF TV transmissions employ the lowest frequency vision carrier in use anywhere in the world, that is, **45 MHz**, the upper sideband being vestigial and the accompanying sound transmitted on **41.5 MHz**. The program carried is the BBC-1 service, on the obsolescent 405-line monochrome standard. Effective Radiated Power is 200 kW, peak vision.

These facts are of little interest to anyone but the enthusiast DX-er, until we realize a fortuitous fact about the frequencies. That is, you do not need to mess around with extra or non-standard tuners or frequency converters to receive British Channel One—it falls right in the pass-band of the standard American TV intermediate-frequency amplifier!

So to look for TV direct from London, all that's needed is a low band high gain antenna, looking generally north-east, or preferably rotatable, a wide-band antenna booster or pre-amp (the CATJ 'Gain Block' would be ideal), and a coupling into the front end of a TV set's i.f. amplifier, with the TV's own tuner disconnected. Then, sometime between October, 1979 and March, 1980 and probably on several occasions, you may expect to see TV signals from England.

To resolve pictures two adjustments and one modification are required to the TV: The Modification consists of inverting the video signal from the TV's

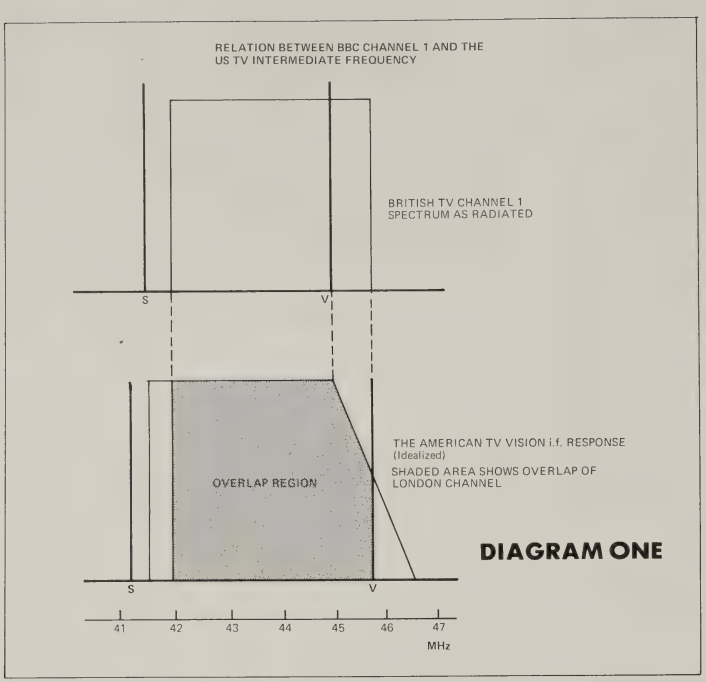


DIAGRAM ONE

detector, to take account of the positive vision modulation used on VHF in Britain. A single transistor phase invertor between detector and video processing circuits will suffice, or merely reversal of polarity of the video detector diode, if accessible. The adjustments are required because of the different line (horizontal) and frame (vertical) frequencies between the 525 and 405-line standards. The line frequency must be reduced from 15.750 kHz to 10.125 kHz, and the frame frequency from 60 to 50 Hz. There may be

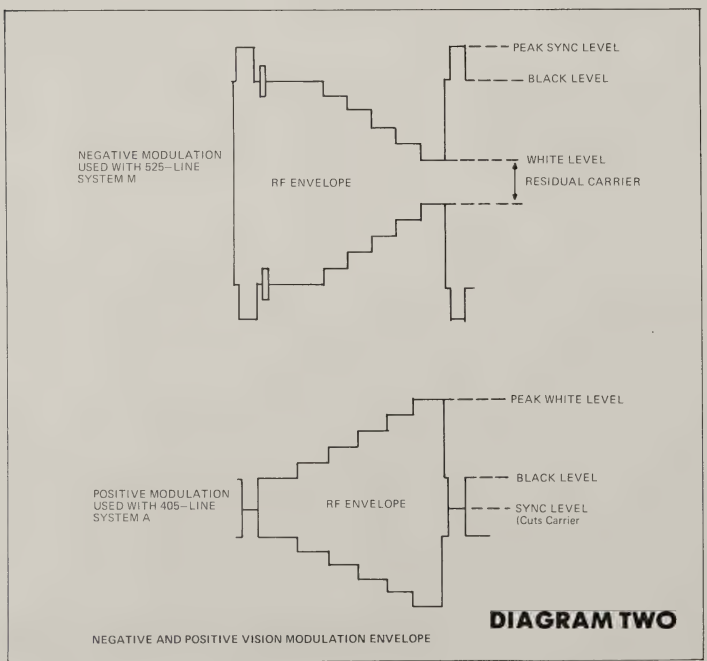
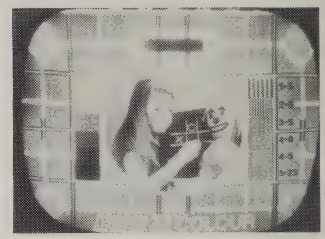


DIAGRAM TWO

NEGATIVE AND POSITIVE VISION MODULATION ENVELOPE



enough range on the horizontal and vertical hold controls to achieve the change, or the fixed series resistors setting control range may need to be changed, depending on receiver design.

Sound reception would involve an AM receiver tuned to 41.5 MHz. A communications receiver might be the easiest way.

Signals are most likely to be seen around 1500 GMT, that is mid-morning in eastern states, early morning on the west coast. BBC-1 schedules vary, but program or test-card transmissions are equally likely at this time of day. Whatever the content, the transmitter is radiating continuously throughout the day and evening, London time.

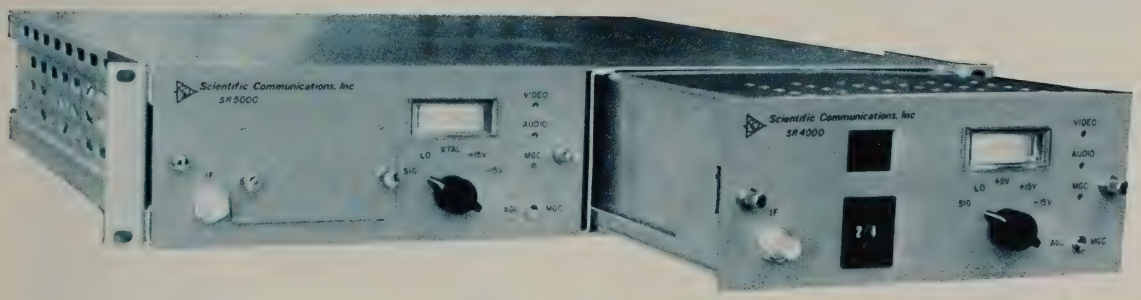
BBC channel 1, 45 MHz, will not exist in 1990, so how about a TV in the corner of the workshop to watch out for it now? I'll gladly help to verify any doubtful reception reports—preferably with the aid of photographs.

LNA Surge Protection

Here is one operators answer to the surge and transient problem that destroyed 5 or 6 of his LNA's in a one year period.

Operating in an area where power outages are quite common the frequency of LNA "Deaths" were becoming a major problem. Reasoning that a non-interrupted source of power to the LNA would be of some help the circuit shown in the figure was designed. The batteries, which are 6V dry cells, serve two purposes. They provide power to the LNA during short power outages but more importantly they act as a good transient suppressor. The power supply uses a 24v transformer in a standard bridge rectifier circuit and produces approximately 28v DC. The series regulator provides 12v to operate the LNA and trickel charges the batteries. The output voltage of the regulator must be adjusted so that the current provided to the batteries is not excessive. This is accomplished by first loading the power supply with an 820 resistor, to simulate the LNA, and trying different zinears in the base of the pass transistor until current flow thru the batteries alone is approximately 2 or 3 ma. You may also find it necessary to add a power diode or two in series with the zinear in order to produce the proper output voltage. Each power diode (shown by the dotted line) will zinear at about .7v and every one you add increases the output by that amount. The .5a fuse between the

SATELLITE VIDEO RECEIVERS



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The compact design of these units allows two receivers to be mounted in a standard 19 inch rack only 3½ inches high. Module construction simplifies maintenance and allows module interchangeability between unit types except for synthesizer/LO source modules.

Simplified Testing

Both receivers were engineered to provide a simple method of testing in an operational environment. A meter and selector switch on the front panel permit the monitoring of critical voltages and the IF monitor output is available at the front panel. An AGC/MGC switch and a manual gain adjustment are also located on the front panel. The rear panel contains an auxiliary video output to allow monitoring of video performance without disrupting programming and an extra pair of audio outputs to facilitate audio monitoring.

Subcarrier Demodulator Option

This feature is pre-wired on all units so that the addition of a printed circuit card can provide up to four subcarriers for audio, slow scan TV or other software offered by the programming originators.

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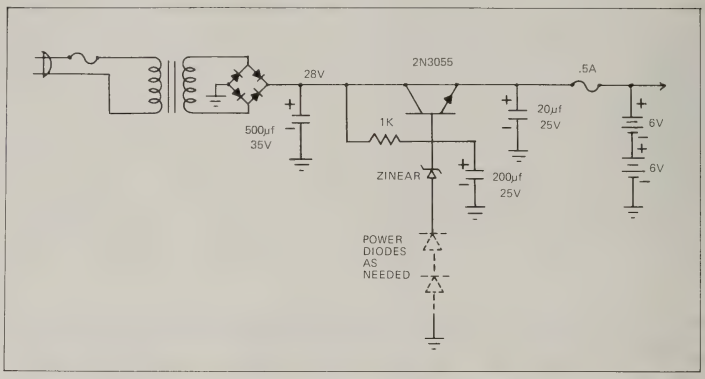
regulator and the batteries will blow in the event that the pass transistor shorts. If this does occur the output voltage should remain in the 12v range because the batteries will absorb the surge and the increased current (thru the batteries) will blow the fuse. The life of the batteries, which are the 6v lantern type, should be at least (and probably more than) their normal shelf life.

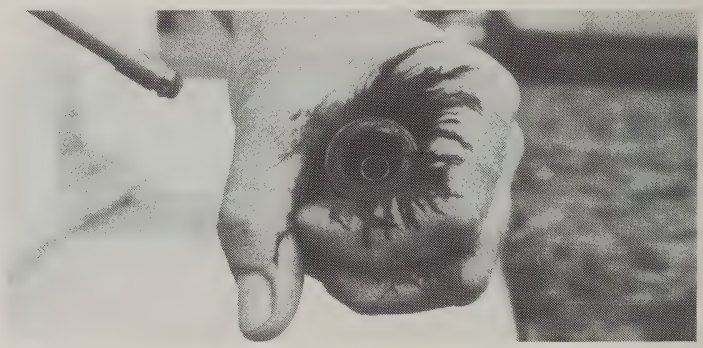
The circuit was not designed to be a stand-by power source, although one did run our test LNA during a 5 hour power outage.

The primary function of the circuit is to reduce transients and it apparently does that. The designer has not had one L.N.A. outage since incorporating the device into his system. Although the circuit shown is for negative ground 12v operation it can, with slight modification, be made to operate as positive ground or 18v or 24v.

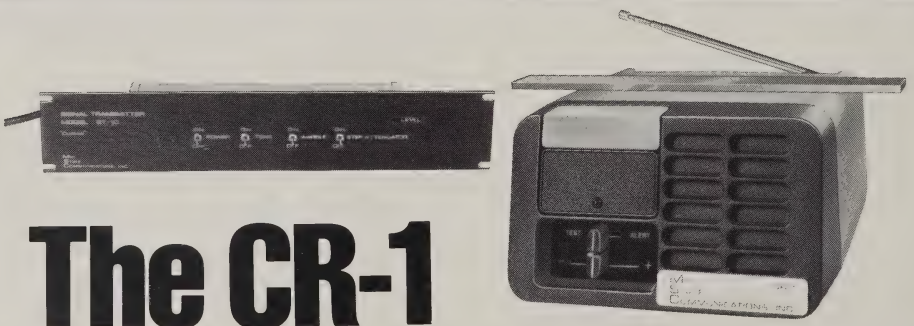


Water In The Down Lead

When you are piping 2 GHZ around, water in the feedline or fittings can mean the instant demise to your signal. This is what happened to one such installation which otherwise worked perfectly. The trouble began with the first good rain, which occured about a month after the earth station had been installed. The first indication of trouble was a decrease in the meter reading on the receiver; incidently, there was no indication of a bad picture. The rain



Using air gun to clean and dry connector.



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and the subsequent drop in signal were not immediately connected although now it seems obvious, but being new in the satellite field and an old timer in the micro-wave end of things, I decided to use the standard micro-wave procedure and wait and see.

This proved to be the wrong approach, things got worse with each rain. Finally it became apparent that the problem was indeed connected with the rains which were now coming on an almost weekly time schedule.

The most vulnerable place in the system was the connector from the large heliax to the small jumper which goes to the LNA. Removal of the connector confirmed that this was in fact the culprit. The connector, in order to make a neat installation, had been cradled in the trough of an angle-iron support. This V-shaped support had acted as a channel funneling water down and across the connector. When it was disassembled, (this paticular connector, by the way, has a left hand thread) about a tea-

Connector and trough before repairs.

CORRECTION

CATJ apologizes for erroneously crediting I. Switzer, P. Engineer, Switzer Engineering Services, in Canada, for authorship on the article TECHNICAL PARAMETERS FOR ANIK SERIES CANADIAN SATELLITES which appeared in our July issue. It has been brought to our attention that the article was prepared by engineers on the TELESAT CANADA staff and credit should be given to them for the preparation of this material.

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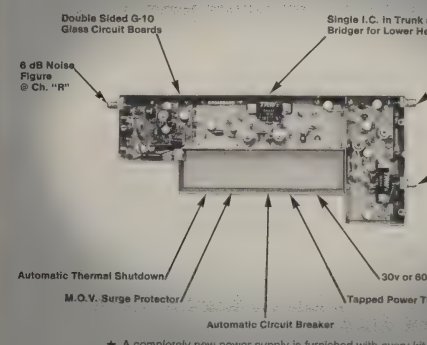
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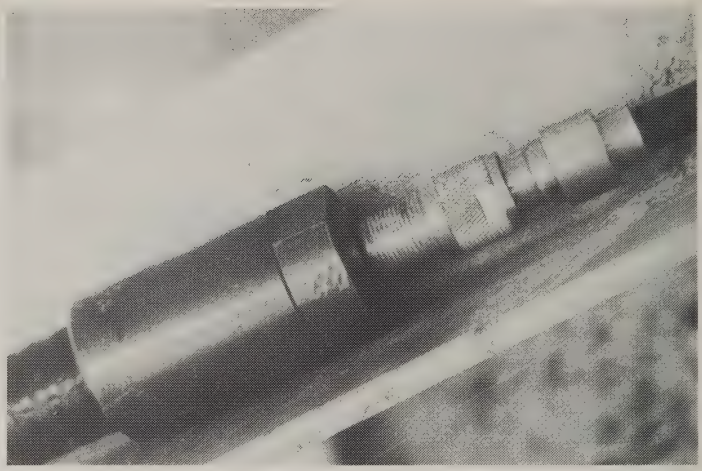

Completed repair with silicone sealer.

spoon of water was drained out. An air tank and several paper towels later the componants of the connector were dried, cleaned and re-assembled. A generous amount of silicone sealer was applied to the connector and the whole assembly was mounted outside the angle-iron trough. Total down time was about 10 minutes.

Even though the connectors on the market today are well designed and in most cases weather proof, one does find that, when installed in the field, that one will occasionally goof. The silicone treatment seems to be one answer to this problem.

HUGHES BOOSTS AML CAPABILITY TO 80 CHANNELS

In response to the decision by the Federal Communications Commission to expand the frequency allocation for Cable Television Relay Services (CARS) from 12.7-12.95 GHz to 12.7-13.2 GHz, Hughes Aircraft Company's microwave communications products is now offering 80-channel capability on its AML local distribution systems.

The FCC ruling has been described as providing greater flexibility for television services in areas served by CATV systems. By doubling the spectrum allocation, additional channel capacity will be made available both for a wider variety of incoming signals and for a second 40-channel CATV system in the same geographic area.

According to A.H. Sonnenschein, Hughes' AML manager, the new equipment is designed to meet the needs of many CATV system operators who are currently building plants with a planned downstream capability of 34 to 40 channels, and who must still accomodate the increased number of upstream services. Among the additional upstream video signals are satellite ground stations, public access channels, plant maintenance data, remote pickups and studio-to-headend links.

Because the AML modulation technique uses only 6 MHz per TV channel, it permits spectrum conservation and therefore greater flexibility in system design, Sonnenschein said. He noted that using AML provides two to four times the TV channel capacity of conventional FM modulations within the allocated frequency band, thus permitting more than one CATV operator to transmit within the same area. For more information, contact Hughes, P.O. Box 2999, Torrance, Ca. 90509.

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A new era quickly approaches in the business of communications via satellite. A major manufacturer of satellite communications products is beginning construction of a plant to make small diameter roof-top dish antennas, in addition to its satellite ground station equipment. In addition, it is reported that a major nationwide retailer of stereo equipment has been surveying potential earth station supplies in order to market television receive only terminals that sell under $1,000.

The growing probability of homeowner earth station appearing on roof-tops across the country is causing some CATV system operators to ask how they can protect their services and thereby prevent significant revenue losses.

Satellite receive-only earth stations designed and manufactured using cost-effective techniques are now available from many suppliers.

These new techniques give useful performance at a relatively inexpensive cost, and an earth station receiver can be built significantly less expensively than a receiver for a point-to-point microwave system.

Widespread use of these systems will lower the costs making this type of equipment even more popular. And before the end of the year, the Federal Communications Commission is expected to deregulate earth stations, which will make it even more attractive to pirate satellite signals, perhaps through use of roof-top dishes.

Major premium programming suppliers and satellite entrepreneurs such as Home Box Office, Showtime, and Comtech Data Corporation contend the current pirating problem occurs in hard-to-prove, isolated cases, mostly from the cable system rather than directly from the satellite. But, these suppliers point out that as the electronics become cheaper, the problem will grow.

As more information is disseminated concerning every aspect of designing, building, installing and operating low-cost television satellite receive terminals, soon amateurs will be able to construct television receive only terminals in their attics. When this happens, the possibility increases for the illegal use of earth stations to receive private satellite communications and entertainment programs.

This concern recently has caused a national telecommunications association to petition the FCC to develop policies governing home satel-

SCRAMBLING VIA SATELLITE: A TECHNIQUE FOR THE FUTURE

Editor's Note: Home-owned earth stations receivers which would pick-up signals directly from the satellite now seem not only possible, but probable. People in the CATV industry have begun to inquire about the potential for proliferation of pirating and how they can prevent substantial revenue losses from illegal pirating of satellite communications and entertainment programs. Comments of Art Johnson, Manager of Field Operations, Oak Communications.

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Scrambling via the satellite using sine wave sinc suppression would require a new baseband video encoder and decoder.

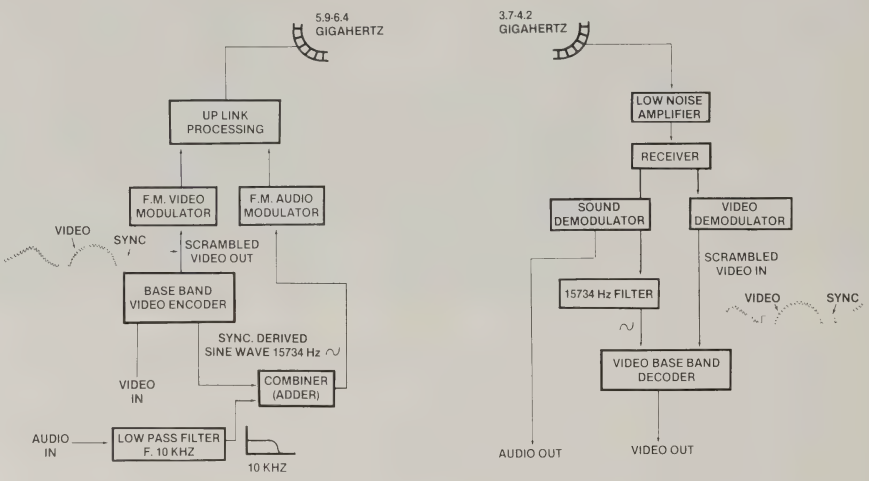

FIGURE 1.
SCRAMBLING VIA SATELLITE

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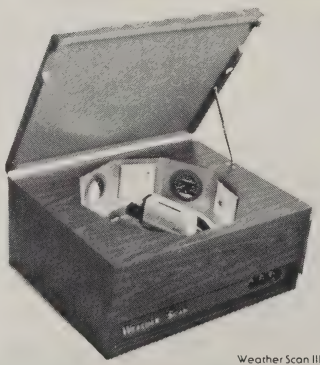

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lite reception before there is any "widespread proliferation of receive only earth stations operated by the general viewing public."

Home-Owned Earth Stations Threaten System

Program suppliers claim that unregulated growth of home-owned earth stations could damage the TV programming market, threaten the conventional system for relaying TV signals and adversely affect local video services.

Because the received satellite signal is not limited to one TV set, homeowners could share their pirated programs with neighbors. Right now channel-sharing is too expensive to implement for most homeowners, but when the production and sale of small antennas, along with receiving equipment becomes more prevalent, prices will drop substantially. "This would significantly reduce present costs of earth station components such as receivers, low noise amplifiers and antennas," says Milton Deever, president of Comtech Data Corporation, a programming supplier in Tempe, Arizona, "And when prices dop like this," Deever adds, "a scrambling system will be needed" to guard against proliferation of pirating.

Engineers at HBO, a New York-based programming supplier, are investigating alternative systems for future system security. One system they are considering is scrambling via the satellite. Though no one has a crystal ball, sufficient time is available to develop a technique which could possibly fill the need for satellite security, HBO engineers say, so that growth of the CATV industry is not affected.

Technique Uses Sine Wave Sync Suppression

One technique engineers propose is sine wave sync suppresion, which is based on suppressing the horizontal sync pulses that are used to synchronize the TV picture with the information transmitted from the video source. This system now is used by about 60 percent of CATV operators who scramble their premium signal, and the technology can be applied to the scrambling system via the satellite with two major modifications.

The sine wave sync suppression system would require a baseband video encoder and decoder. The system would work like this: (Refer to Fig. 1)

The premium video would be scrambled before the up-link transmission of the satellite. This is where a baseband video encoder using sine wave sinc

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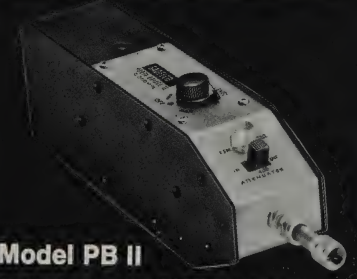

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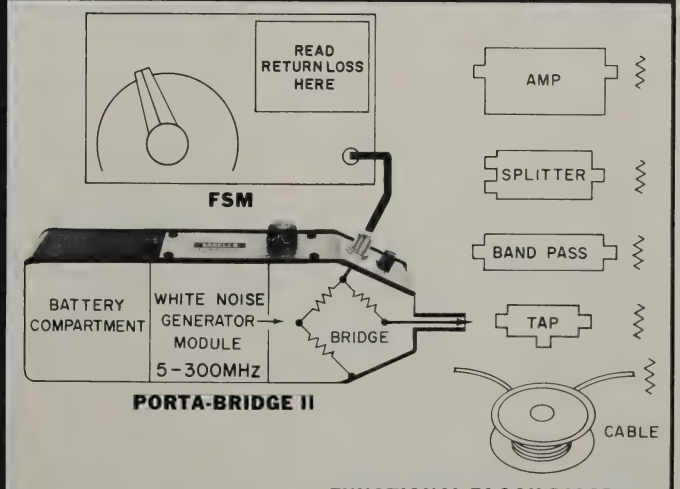

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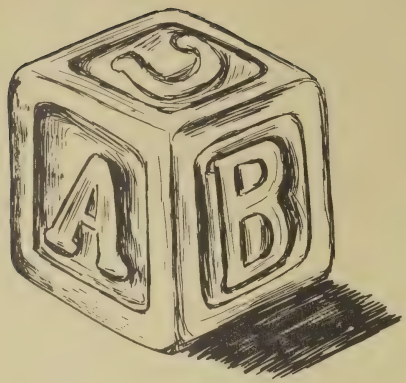

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suppression would be required.

The baseband video information and a superimposed sine wave at 15734 Hz are delivered to the video FM modulator. The analog wave form is converted to zero crossovers for the uplink transmission via satellite.

Low Pass Filtering of Baseband Audio is Required

The decode information can be conveyed on the audio FM carrier by low pass filtering the baseband audio to remove any frequency components above 10 kHz. The 15734Hz sine wave, which was used to scramble the baseband video, then is added to the output. This may require a modification to the FM audio modulator at the transmitter.

At the TVRO the process is reversed. The output of the sound demodulator can be applied to a bandpass filter to separate the 15734Hz sine wave, which then is applied to the video baseband decoder. This filtered sine wave then is used to decode the scrambled video by being reversed in phase and applied to the proper AGC stages in the decoder. The sound demodulator also may require a slight modification to detect higher-than-normal frequency.

No Separate Channel Needed

Gated sync suppression is another way to accomplish video scrambling. This technique has its disadvantages, according to engineers, because a separate data channel is required which could be transmitted on a subcarrier but involves special modification of the satellite link for sync recovery and restoration of the TV picture. No separate channel is required for sine wave sync suppression.

Programming suppliers surveyed say there is a need for a system such as scrambling via the satellite.

"If earth stations are sharply reduced in price to a level below about $1,000," there will be a need to develop a technique such as the one proposed, says John Sie, vice president for Showtime, a New York-based programming supplier.

Some programming suppliers say their staffs are investigating alternative techniques, though they say scrambling via satellite appears to be an easy way to interface a large assortment of equipment.

Time To Develop

Baseband video encoders and decoders for the scrambling via satellite system would take time to develop. And time in the electronics business has a way of forcing cost reductions to take place, thereby making the equipment reasonably affordable.

Current CATV TVRO earth stations are still too expensive and technical to appear on roof-tops across the country. But major programming suppliers and engineers agree that if the prices of home-owned earth station receivers continue to decline, the time will come for a scrambling system to guard against the potential of world-wide signal theft.

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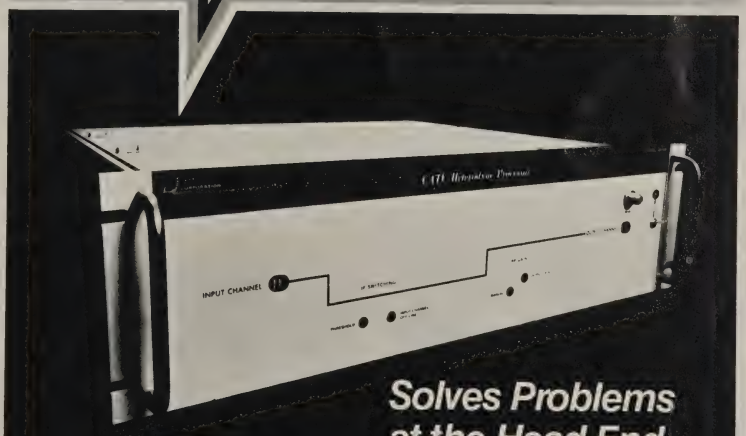

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Steve J. Birkill On Experimental Earth Terminals

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(Requested repeat of February 1979 column.)

A practical feed antenna for plane or circular polarization

The feed to be described is one I constructed some eighteen months ago to provide a circular polarisation facility for my then newly-tried 4 GHz receiver. Most of the satellite signals receivable at this location employ circular polarisation, and to receive them with a **plane-polarised** pyramidal horn feed would have incurred an unacceptable **3 dB loss of signal.** The f/D (focal length to diameter) ratio of my 8-foot dish is 0.375—rather a short focus for an earth-station, but one I had to live with. Why should I regard this as a disadvantage? If we look at the geometry of the direct-feed (prime focus) arrangement (**figure 1**), we see the requirement to provide illumination of the reflector surface from the focus of the dish, and confine the feed radiation within an angle **2 theta,** and, distribute it **evenly** over the dish surface. (In keeping with antenna convention, we speak of radiation, though the antenna is a reciprocal system and behaves identically in the receiving mode.) Desirable though it is to achieve an even distribution of energy over the surface, with sharp cut-off at the rim of the dish, **no practical feed can achieve this ideal.** As with most directional antennas, the feed has maximum radiation on axis, tapering toward the edges. So to define feed beamwidth we must specify the beam-edge power level relative to on-axis or boresight power density. For a complete antenna we normally speak of the half-power or 3 dB beamwidth. For dish feeds the 10 dB beamwidth point(s) are a more useful value.

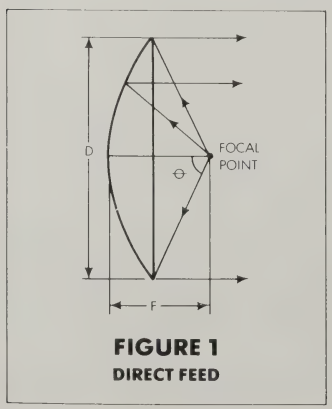


FIGURE 1
DIRECT FEED

Optimum beamwidth of feed antenna

Given that our feed must radiate a beam tapering from its on-axis value, we must decide how most efficiently to illuminate our dish with this beam. If we adopt a **narrower than optimum feed beamwidth,** then most of the energy radiated by the feed is intercepted by the reflector, but the center of the reflector is receiving a proportionately greater concentration of energy than the edge, such that the edge contributes little to the gain of the antenna. And square meters are expensive! Conversely, if the feed distributes its energy over **too wide an angle,** then while our dish is illuminated more evenly, we are now **losing** a significant amount that is missing the reflector and 'spilling' over the edge. This not only reduces the gain, but more importantly in a **receiving** application this spill-over means the feed sees not only satellite and cold sky reflected from the dish surface, but also whatever is in its line of sight **around the edge** of the dish. And this is usually some kind of terrestrial real-estate, all radiating healthily **and noisily** at 290 degrees Kelvin (or so)! So up goes our antenna noise temperature, along with the loss of gain. Some commercial antennas use a reflecting **shroud** around the edge of the dish, to convert these stray 'back-lobes' of the radiation pattern to **less harmful** 'side-lobes' in the forward direction. Another technique is to employ an RF-absorbent material for the 'shroud', but though it can give a very clean radiation pattern it is more suitable for terrestrial applications where antenna noise is less of a factor **—the absorber itself is a noise source at 290K!**

Most paraboloid reflectors operate without shrouds of either kind, and **a typical value of 'feed taper' adopted is 10 dB.** This means the **edge** of the reflector receives **one-tenth of the power flux** arriving at the center. So this means the 10 dB beamwidth of the feed needs to be 2 theta? **No.** The **edge** of the reflector is already at a slight disadvantage with respect to the centre, because of its greater distance from the feed. This we call the **space loss,** and it depends upon the f/D ratio of the paraboloid.

Optimum value of f/d ratio

Considering extremes, if the focal **point** were in the **plane** of the aperture (the so-called 'focal plane' dish), **then f/d is 0.25,** and the rim is **twice as far** from feed as the center. So space loss is 6 dB—for **edge** illumination of **minus 10 dB,** the reflector intercepts only the energy **within the 4-dB beamwidth of the feed,** that beamwidth being 180 degrees (the angle subtended by the reflector at the feed, or 2 theta). To design a feed having such a **wide** beam, and still obtain **good VSWR** over the required bandwidth is not easy. Efficient illumination also requires the E- and H-plane beamwidths of the feed to be equal, and to have the same phase center (the point from which radiation appears to diverge, and which we require to be at the focus of the reflector). All these considerations point to the advantage of a relatively **high** f/D ratio, **as high as 1.0.** Above this, the structure starts to become unwieldy, and the long feed support struts become a problem—as they are necessarily made stronger, the obstruction and scattering they cause becomes significant.

The Cassegrain Feed

One way of combining the **low noise** of a **low f/d reflector** with the high efficiency and feed realizability of the high f/d dish is to use the **Cassegrain system.** This places a hyperboloidal subreflector between the main reflector and its focal point **(figure 2).** This generates a new focus **closer to** the dish, and reduces the angle subtended at the focus. So the feed horn can sit on the end of a short waveguide run to the LNA, sheltered behind the dish surface, improving reliability and accessibility without the need for the long 'button-hook' waveguide needed if we require our LNA to be **away from** the focal point in a direct-fed antenna. The half-angle 0' is clearly much reduced from 0 in figure 1, for a given f/D ratio. The principal **disadvantages** of the Cassegrain arrangement are the inevitable blocking (shadowing) of the center section of the main reflector by

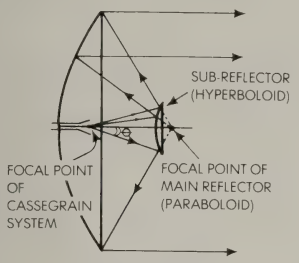


FIGURE 2
CASSEGRAIN FEED

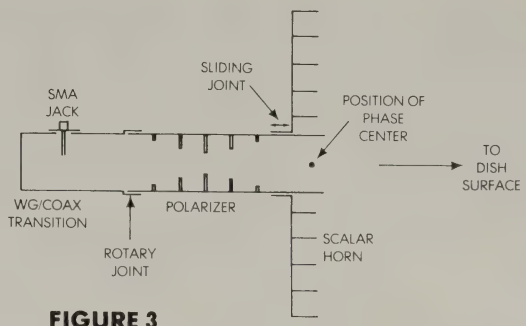


FIGURE 3
ASSEMBLED FEED SYSTEM

the sub-reflector, and the requirement for a second accurately machined and positioned (sub-reflector) surface. Large earth stations commonly employ a modified Cassegrain feed where the geometry of the reflectors differs from the true paraboloid and hyperboloid, to maximise the illumination efficiency. And at least one commercially available TVRO antenna uses a conical sub-reflector to approximate a hyperboloid, apparently with success.

point of the horn can be adjusted (to optimise feed beamwidth for different f/D ratios) by making the horn a sliding fit on its feed waveguide, a 2-inch diameter cylindrical copper pipe propagating the TE_{11} mode.

Polarizer

To handle circular polarization as well as plane (or linear), a polarizer (or, since we are interested in receiving, a **depolarizer**) is required. This needs to be **birefringent** to orthogonal TE_{11} modes in the circular waveguide. **That is, it must introduce a 90-degree differential phase shift between horizontally and vertically polarized waves.** Thus a plane polarized wave passing through the polarizer at 45 degrees is converted to a circularly polarized wave, the sense of rotation dependent on which direction the initial 45-degree rotation is applied.. And similarly circular polarization will be converted to linear. So, for a given orientation of the polarizer, **the two senses of circular polarization** will give rise to **either** horizontal **or** vertical polarization out of the polarizer. If we then insert an orthogonal mode coupler, we can recover **both** senses simultaneously and independently. See **figure 4.**

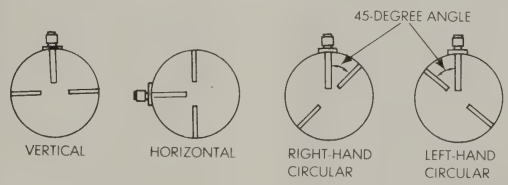


FIGURE 4
FEED ORIENTATIONS FOR THE FOUR PRINCIPAL SENSES OF POLARIZATION. VIEW INTO OPEN END OF FEED HORN.

But if we don't need both at once, a rotatable joint in the circular waveguide will enable us to select one **or** the other. As a bonus, if we set the rotation to its mid-position, such that the elements of the polarizer are at 90 degrees to the output plane, they will then have **no effect on** a linearly-polarized wave. So by then rotating the entire feed we can line up with **any direction** of plane polarization as well!

Hybrid-mode feed

An alternative means of efficiently illuminating a low f/D dish is the **hybrid-mode scalar feed** or **corrugated horn.** This overcomes the limitations of the conical or pyramidal horn by providing a reactive surface along the flare of the horn such that it cannot support a surface wave, and the hybrid-mode HE_{11} is generated in the aperture, a combination of the TE_{11} and TM_{11} modes. The reactive surface is formed by the corrugations along the flare, and by feeding the horn away from the vertex a 90 degree flare angle can be used, which simplifies construction. The axial symmetry of the HE_{11} mode is of value not only in maximising illumination efficiency, but also in maintaining polarization purity for circularly-polarized waves, essential where orthogonal polarizations enable frequency re-use. This type of horn was chosen for the feed to be described, being easier (at the time) to construct than the Cassegrain system. The feed

Waveguide-to-coaxial transition

The design here shows an adaptor from linear TE_{11} to an SMA 3mm coaxial connector. This was just the most convenient connection at the time the feed was built. A more appropriate interface for TVRO hardware would be the **CPR 229 waveguide flange.** The way to do this is by forming a gradual transition between the 2-inch circular waveguide and the 2.290 x 1.145 inch rectangular WR229. Provided this is **internally smooth** and **at least 3 inches in length,** it should perform as well as, or probably better than, the coax version. See **figure 5.**

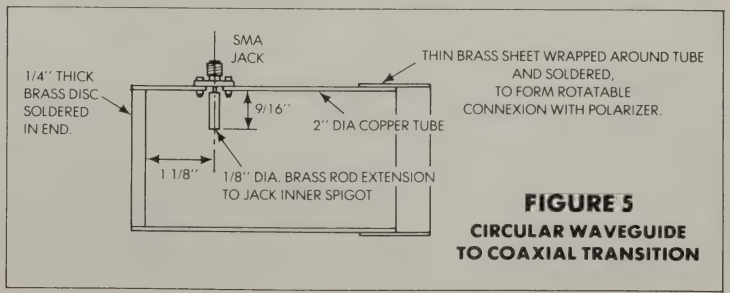


FIGURE 5
CIRCULAR WAVEGUIDE TO COAXIAL TRANSITION

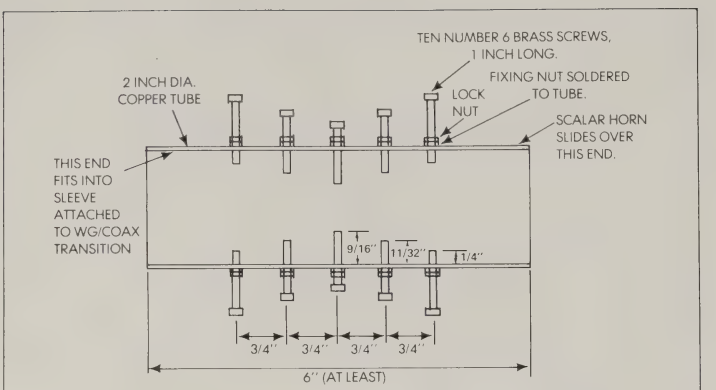
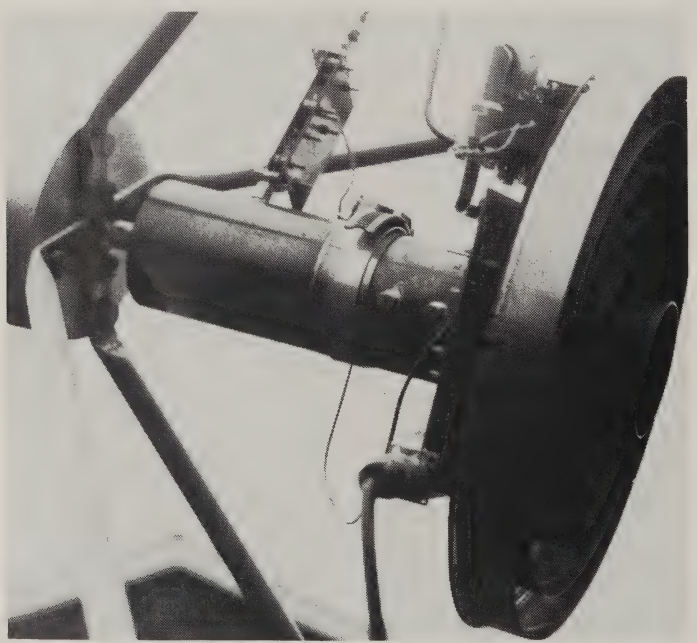


FIGURE 6
POLARIZER



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10 DB.
121.25
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3367

Alignment

The polarizer requires final adjustment on a circularly polarized (eg. Intelsat) signal. The penetration of the screws should be adjusted (maintaining symmetry) for maximum signal when set for the 'wanted' sense of polarization, and minimum when rotated 90 degrees. A mid-band signal should be used. The angle should be set carefully during this adjustment. An intermediate setting of this angle (between polarizer elements and coaxial probe) will give elliptical polarization. Precise aiming of antenna onto satellite should be checked before concluding the adjustment. The scalar horn should be positioned to maximise carrer/noise ratio on the satellite signal, bearing in mind that its adjustment will shift the feed's phase center—feed-to-dish spacing may have to be optimized at the same time. See **figure 6.**

Caveat

This design is offered with the experimenter in mind. It has been in near continuous use since its construction, and has not been evaluated in the lab. It is quite possible that its performance could be improved upon, but it has proven itself in service. My prototype is mounted from the closed end of the waveguide. If mounting from the horn were desired, the construction would have to be strengthened a little. Going the other way, tin cans could be a simple and cheap alternative to copper pipe!

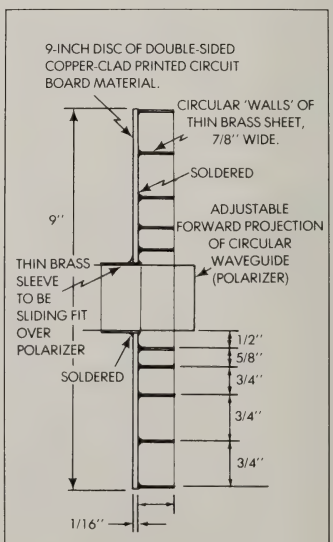


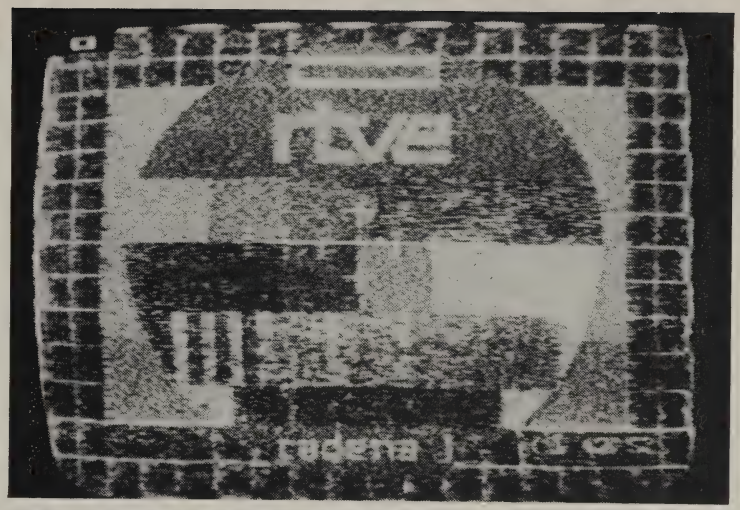
FIGURE 7
SCALAR HORN

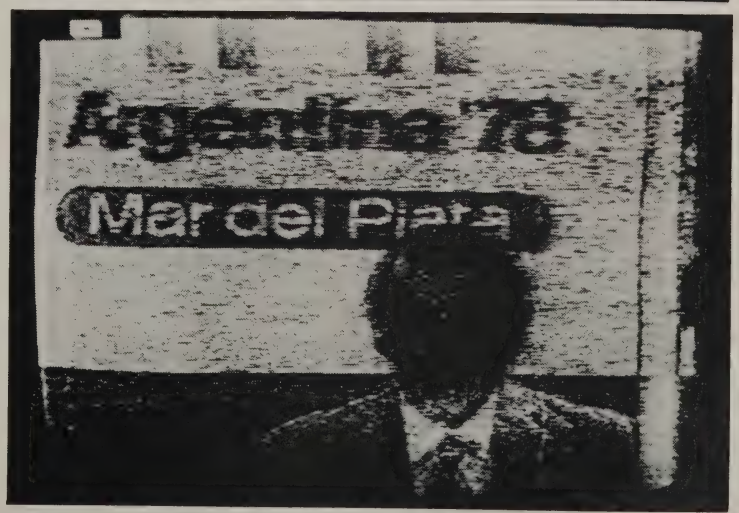
The photograph shows the feed in position on the 8-foot dish. A hose clip clamps the polarizer at its correct orientation for the **right-hand circular** Statsionar signals. The assembly attached to the coaxial connector is the original 4 GHz LNA in use at my location, comprising two stages of Hewlett-Packard HXTR-6101 bipolar transistors, each capable of 10 dB gain with better than 3 dB noise figure at this frequency. The overall system noise temperature achieved with this arrangement was about 400K. Also visible on the photograph is part of the first down-converter, which provides a gain of around 40 dB while transposing the entire 4 GHz band to the UHF range (450 to 950 MHz in this case) where it can be fed to the house with low loss using standard coaxial cable, channel selection then being a simple matter. The rear surface of the scalar horn provides a convenient mounting for this down-converter, the intermediate frequency output (and 12V DC power input) appearing on the BNC connector lower center of picture.

Rare Birds

I should think by now, many readers will have had their curiosity stirred to explore among the Intelsat channels and see what is flying around up there. I would like to compile a listing of what TV services are regularly available, on a bird-by-bird, transponder-by-transponder basis. It is known that **Intelsat time is currently leased** for TV by **Algeria,** Brazil, **France,** Malaysia, **Nigeria,** Oman, **Spain,** Sudan, **Portugal,** Uganda and **Zaire.** We don't yet know 'where' to find all these services. Of course they aren't all in view from any one location, but it would be handy to know which one appears on which satellite and transponder. So if you could share your findings with me, I can't guarantee a personal reply to all letters, but the results will be published in this column and give us some idea where to find the new services and how the signal levels, transmission standards and program times compare.

The screen photos in this month's column show **half-transponder** TV transmissions from **Spain** (the daily program relay to the Canary Islands on **hemispheric** beam), **Sudan** (internal TV distribution, **global** beam) and **Argentina** (typical international news/sport type coverage, **global** beam, taken during the World Cup soccer series of last summer). If they don't look too good, compare your system with the 8 foot, 185K presently in use here and remember Intelsat operates 10 to 14 dB(w) **below** your 'potent' U.S. and Canadian domestic birds! Any readers' screen shots would be most welcome for publication.





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EAGLE COM-TRONICS, INC., P.O. Box 93, Phoenix, NY 13135 **(M9 Pay TV Delivery Systems & Products)** 315—695-5406
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Cable Size	Db/100 feet	
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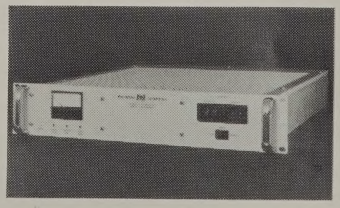
.500"	1.15	1.20
.750"	.77	.80
1.000"	.63	.65

Mr. Schwager, National Sales Manager, expects Fused Disc III to be fully available sometime in the fourth quarter of this year. For more information, give Rick Schwager a call at 201-636-5500, or write him at P.O. Box 700, 1 Woodbridge Center, Woodbridge, New Jersey 07095.

MICRODYNE INTRODUCES NEW RECEIVER FOR SATELLITE TV SYSTEM

Microdyne Corporation has introduced a new 24-channel receiver for satellite receive only ground stations. Designated the X-24, the receiver features complete frequency agility as well as automatic polarity selection as standard features.

The frequency synthesized 24-channel receiver can be tuned manually using front panel controls or remotely via a BCD interface to provide a wide choice of remote tuning methods including computer control. Unique threshold extension circuitry, a standard feature, insures optimum FM



demodulator C/N performance. An internal coax switch automatically selects the properly polarized antenna feed when any one of the 24-channels is selected. This eliminates the possibility of a cable switching mistake and allows both vertical and horizontally polarized inputs to remain connected to the rear panel.

Additional capability is available with an optional rack mount Audio Subcarrier Demodulator. This 1-3/4" high unit provides up to four subcarriers ranging from 4.5 to 7.5 MHz for processing slow scan video, high fidelity audio or other software items offered by the programming sources.

Microdyne Corporation (OTC NASDAQ—MCDY) is a leading supplier of satellite television earth terminal systems, satellite television receivers, and general purpose telemetry receivers. The corporation maintains its headquarters in Ocala, Florida. It operates plants in Ocala, and Cumberland and Rockville, Maryland.

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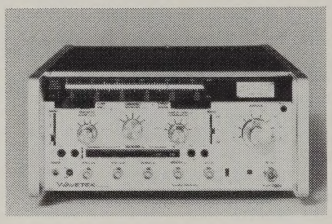
This programmable instrument can be operated in any of three modes—Start/Stop, △F or CW. The 2002A will



sweep any portion of any one or more bands, in either direction, at any rate from 50 sweeps per second to 1 sweep every 100 seconds. Standard features include an output meter calibrated in dBm, a 1KHz square wave modulator, a slope control which compensates for frequency dependent variations in the external circuitry, and sweep delay capability.

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For further information contact:
Wavetek Indiana, Inc.
66 N. First Avenue
P.O. Box 190
Beech Grove, IN 46107
(317) 783-3221

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2) **Member-systems** pay regular dues to CATA on a monthly basis; Associate members pay a one time annual fee; "Individual" members pay a one time annual fee of $25.00 per year.
3) **CLASSY-CAT advertising is also available to non-members** at the following rates: **50 cents per word** with a minimum per insertion of $20.00. A charge of $2.00 per insertion is made for blind-box numbers or reply service.
4) **Deadlines** are the 15th of each month for the following month's issue.
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Clearview Cable Co., Inc.
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City Hall
1050 Camino Del Mar
Del Mar, CA 92014

SATELLITE T.V. RECEIVER DEALERSHIPS AVAILABLE. Individuals wanted to represent our line of commercial quality and cost effective products. An opportunity to acquire an earth station and enter this exciting business. Inquire by mail **only.** AVCOM of Virginia, Inc., 10139 Apache Road, Richmond, VA. 23235.

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4 Receivers, Farinon SS6000 VC including waveguide and 2 6' dishes, 6226.9 MH2 and 6286.2 MH2. Three years old. Cablevision Systems, Inc., Box 1624, Seminole, Okla. 74868. (405) 382-2878.

Complete 24 channel dual polarized earth station—installed—with site preparation. $19,500.00 Contact: David Friar, 960 Madison Eugene, Oregon 97402 or call 503-343-4165.

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San Antonio, TX 78205
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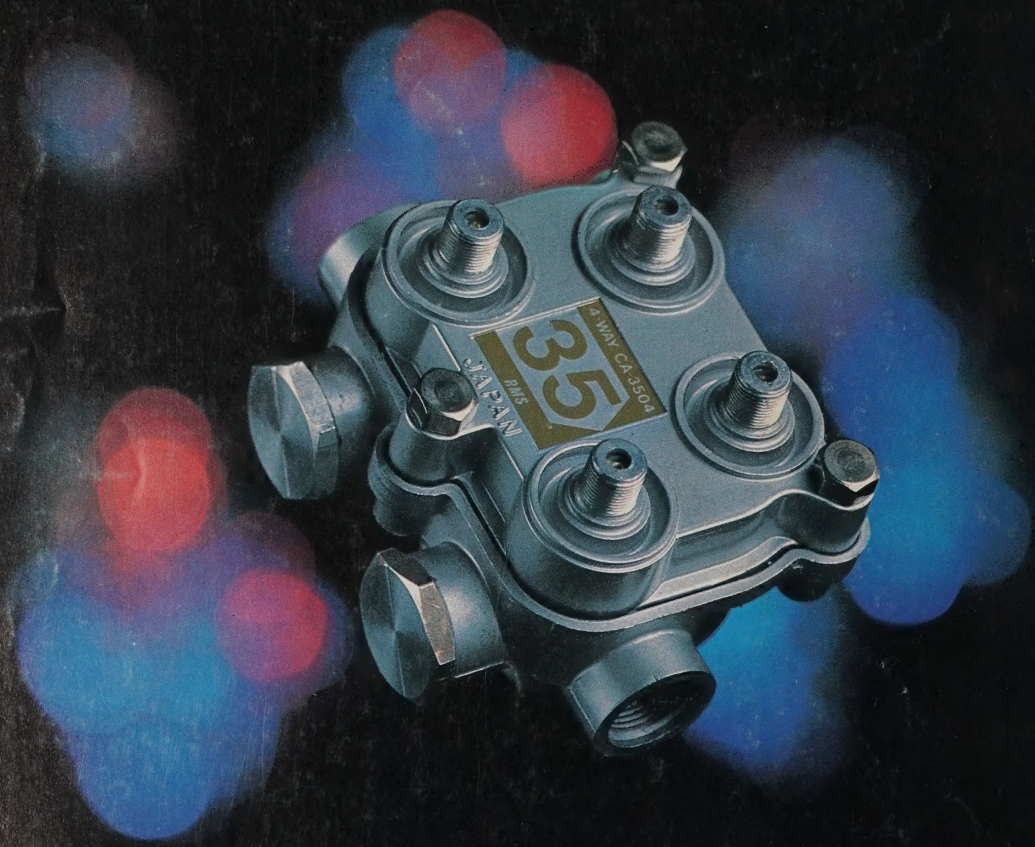

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